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54th ANNUAL MEETING

Florida Scientist

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Volume 53

Supplement 1

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ACKNOWLEDGEMENTS

Production of the 1990 Program Issue was made possible through the support of the Mote Marine Laboratory, Sarasota, Florida. Mrs. Linda Franklin assisted with text processing and the issue was printed by Sperber Printing Company.



1990 PROGRAM ISSUE

**THE FIFTY-FOURTH ANNUAL MEETING OF THE
FLORIDA ACADEMY OF SCIENCES**

in conjunction with the

Florida Junior Academy of Sciences
and
Science Talent Search

American Association of Physics Teachers
(Florida Section)

Southeastern Marine Mammal Stranding Network

Featuring Two Symposia

"Biology and Management of the Florida Apple Snail"

and

"Human Maritime Adaptations in the Cedar Keys, Florida"

With Two Plenary Addresses

"The Bass Biological Laboratory of Englewood, Florida, 1931-1944"
by Ernest D. Estevez

and

"Eclipsing Variable Stars Observed from the South Terrestrial Pole"
by Frank Bradshaw Wood,
1989 Academy Medalist

FLORIDA INSTITUTE OF TECHNOLOGY
Melbourne, Florida

March 22, 23, 24, 1990

FLORIDA SCIENTIST
Volume 53 Supplement 1

ISSN: 0098-4590

Price: \$ 3.50

Published by the Florida Academy of Sciences, Inc.
810 East Rollins Street, Orlando, Florida 32803

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NOTICES

SMOKING - Smoking is prohibited in all interior campus spaces.

HANDICAP ACCESS - Most meeting rooms are accessible to persons using wheelchairs. Meeting participants with special access needs should contact Dr. Robert Heidinger, Florida Institute of Technology, 150 West University Blvd., Melbourne FL 32901-6988, telephone (407) 768-8000, extension 8125, or FAX (407) 984-8461.

WELCOME

Welcome to the fifty-fourth annual meeting of the Florida Academy of Sciences. In 1989 and 1990 we have adopted the motto, "In touch with people in touch with the future". It is fitting that this motto was suggested by a group of students from the University of Florida. This year, programs for or including students are more numerous than ever, and the Meeting includes several sessions with the future of science and students in mind. Every section will be judging graduate and undergraduate student papers for a variety of honors and awards. The Junior Academy has organized an excellent competition for high school students and our Engineering Section has arranged a special program, "Expanding your Horizons in Engineering, Science and Mathematics for Women", targeting local eighth to eleventh grade students. The Academy strives to foster a sense of community among Florida scientists and students at all levels and your participation helps build the network of knowledge that is needed to meet the challenge of rapid population growth affecting all Floridians.

Ernest D. Estevez,
1989-1990 President

MEETING INFORMATION

LOCATION - The Florida Institute of Technology (FIT) was founded in 1958. As the only private science and technological university in the southeastern United States, FIT has grown rapidly with a current enrollment of 6,700 students, of which 4,200 are undergraduates. FIT now offers more than 121 degrees from the Associate through Doctorate levels, in science and engineering, aviation, business, psychology, and communications.

REGISTRATION - All participants are expected to register. A registration desk will be open in the lobby of Gleason Auditorium from 7:30 am to 4:00 pm on Friday, March 23, and from 8:00 to 9:30 am on Saturday, March 24. The registration fee is \$15.00 for FAS members, \$20.00 for nonmembers, and \$5.00 for students. Members receive the program issue by mail, as will others registered by March 2. A late registration fee of \$5.00 will be assessed for members and nonmembers (students excepted) registering after March 2. Extra programs cost \$3.50.

LODGING - No reservations can be made through the Academy. The following facilities offer special conference rates if you identify yourself with the Academy and if you make your reservation by the date specified. All require a credit card number or one night prepayment for confirmed reservations.

Two hotels are near the ocean in Indiatlantic or Satellite Beach, approximately eight miles from campus:

HOLIDAY INN OCEANFRONT: (EXCLUSIVE 1990 FAS CONVENTION & BANQUET HOTEL)
2605 A1A, Indiatlantic, Florida
(800) 465-4329 or (407) 777-4100
Single/Double \$45.00 by March 8

RAMADA OCEANFRONT: 1035 Highway A1A, Satellite Beach, Florida
(407) 777-7200
Single/Double \$55.00 by January 31

Another hotel is located in Melbourne about four miles from campus:

MELBOURNE RIVERVIEW INN: 440 South Harbor City Boulevard
(HOWARD JOHNSON'S) (407) 723-3661
Single/Double \$39.00 by March 1

MEALS - The campus cafeteria will be open for lunch on Friday, and complimentary refreshments will be available during breaks on Friday and Saturday mornings. Information on local restaurants will be available at registration.

BANQUET PROGRAM - The Academy Social and Banquet will be held on Friday evening, March 23, 1990 at the Holiday Inn Oceanfront. All meeting participants are invited to the Social, which begins at 6:30 pm. Ticket-holders may stay for the Banquet which begins at 7:30 pm. Participants should preregister for the Banquet because only a few tickets will be available at registration.

Dinner entrees include roast sirloin of beef au jus, boneless chicken breast, or a vegetarian platter. Each is served with salad, bread, potato, dessert, and choice of wine or non-alcoholic beverage.

After dinner, the 1989 Academy Medalist, Dr. Frank Bradshaw Wood, will offer a banquet address, "Eclipsing Variable Stars Observed from the South Terrestrial Pole". The William W. Behrens, Jr./ Florida Institute of Oceanography Award will be presented and other Academy honors will be bestowed. The Banquet Program will conclude with the installation of the new Academy President, Dr. Fred Buoni.

TRANSPORTATION - The FIT campus is located approximately two miles from the Melbourne Regional Airport. Travel, Inc. of Melbourne (800-334-6576) will make discounted reservations for air travellers and can handle other travel arrangements.

Transportation will be available between FIT and the hotels. For special transportation assistance please contact the Local Arrangements Chairman.

ANNOUNCEMENTS

COUNCIL MEETING - The Executive Committee and Academy Council will meet at 2:00 pm on Thursday, March 22, 1990, in Classroom Q-17, Building 3 of the campus Quad complex.

ANNUAL BUSINESS MEETING - The Academy's annual business meeting will begin at 1:15 pm in the Teaching Pavilion, Room P-133. Members of the Executive Committee and chairs of sections and standing committees are asked to bring written 1989-1990 reports.

Special Announcement

AMENDMENTS TO BYLAWS OF THE FLORIDA ACADEMY OF SCIENCES, INC.

Pursuant to Council action at previous meetings, two amendments to the Bylaws of the Florida Academy of Sciences, Inc. will be considered for adoption at the annual business meeting. One amendment changes membership fees and another changes the name of an existing section. Section 2, Article XI of the Academy's CHARTER provides for the adoption, alteration, amendment, or rescission of BYLAWS at any annual business meeting of the Corporation if approved by a two-thirds (2/3) vote of members present, provided notice of proposed amendments has been given to members at least thirty (30) days prior to the meeting.

Amendment One: Amends BYLAWS Article I, Membership; Section 2, Eligibility, Admission and Classes, as follows:

- item c. Corporate membership dues are raised from \$100.00 to \$150.00;
- item e. Sustaining membership dues are raised from \$25.00 to \$ 35.00;
- item f. Regular membership dues are raised from \$18.00 to \$25.00.

Amendment Two: Amends BYLAWS Article II, Academies and Sections as follows:

- Section 2. The section, "Environmental Chemistry", is changed in name to "Environmental Chemistry and Chemical Sciences".

PLENARY ADDRESSES - Two lectures will be offered to the Academy at large.

I. "The Bass Biological Laboratory of Englewood, Florida, 1931-1944" will be presented by Ernest D. Estevez, Mote Marine Laboratory, immediately following the annual business meeting, in the Teaching Pavilion, Room P-133, on Friday, March 23, 1990. Dr. Estevez is the 1989-1990 President of the Florida Academy of Sciences.

II. "Eclipsing Variable Stars Observed from the South Terrestrial Pole" will be presented by Frank B. Wood, University of Florida, at the Academy banquet, the night of Friday, March 23, 1990, at the Holiday Inn Oceanfront. Dr. Wood is the 1989 Academy Medalist.

FAS TUTORIAL - In response to a Council request made at the January 1990 meeting, FIT has arranged a tutorial session on a topic of general interest to Academy members:

Donald W. Fausett and Laurene V. Fausett of the FIT Department of Applied Mathematics will offer a SURVEY OF NEURAL NETWORKS on Friday afternoon, March 23, 1990, at 3:15 pm in the Teaching Pavilion, room P-133. An abstract for their presentation appears on page 1.

The tutorial will be of interest to researchers in psychology, electrical engineering, biology, computer science, physics, mathematics, and operations research. All meeting participants are encouraged to attend.

SYMPOSIA - Two symposia have been organized for the 1990 annual meeting:

"Biology and Management of the Florida Apple Snail", organized by Richard L. Turner (Florida Institute of Technology), will begin at 8:30 am on Friday, March 23, in Classroom 3, Building 1 of the campus Quad complex.

"Human Maritime Adaptations in the Cedar Keys, Florida", organized by Nina T. Borremans (University of Florida), will begin at 3:00 pm on Friday, March 23, in Classroom 10, Building 2 of the campus Quad complex.

INFORMATION FOR SPEAKERS - All rooms will have slide and overhead transparency projectors and screens. Speakers requiring other equipment should contact Barbara Bishop, FIT Office of Administrative Services, at (407) 768-8000, extension 8125.

Student speakers should identify themselves to the session chair prior to speaking.

All posters will be presented during break periods, in rooms used for paper sessions, and therefore must be installed before the session begins.

If an author or co-author is scheduled to speak but cannot attend due to unforeseen circumstances, arrangements should be made for a colleague to present the paper. If a reader cannot be found, the paper should be cancelled. The Academy must be notified of substitute speakers or cancellations, by contacting the appropriate section officer.

MARINE MAMMAL STRANDING NETWORK - The Network meeting begins at 9:00 am on Friday, March 23, 1990, in classroom S-112 of the Crawford Science Building. The meeting includes a review of marine mammal strandings in the southeastern United States, with specific reference to Florida events in 1989; reports on national meetings and other networks; and Florida case-studies. A necropsy demonstration is planned for the afternoon. Persons interested in attending the Network meeting should contact Dr. Daniel K. Odell, Sea World of Florida, (407) 363-2158.

Persons registered for the FAS Annual Meeting may attend the Network meeting on a space-available basis. Network members wishing to attend FAS sessions are asked to register, but may attend the afternoon Plenary Address or Tutorial as FAS guests.

FIELD TRIPS - FIT is organizing field trips to Sebastian Inlet, Indian River Lagoon, and the Kennedy Space Center. Specific information will be available at registration.

LOCAL ARRANGEMENTS - Meeting arrangements at the Florida Institute of Technology are coordinated by Robert Heidinger, Director of Administrative Services, who may be consulted on any aspect of meeting support, including special services, by calling (407) 768-8000, extension 8125.

PUBLICATION - The 1990 Annual Meeting Program Issue is Supplement Number 1 to Volume 53 of the Florida Scientist, and will be distributed to more than 200 domestic and foreign libraries and to major abstracting services.

PROGRAM SUMMARY

THURSDAY AFTERNOON, MARCH 22, 1990

1:30 pm	FAS Council Meeting.....	Quad 17
6:00 pm	Junior Academy Judging.....	TBA*

FRIDAY MORNING, MARCH 23, 1990

7:30 am	Registration (to 4:00 pm).....	Gleason Lobby
8:15 am	Science Teaching A.....	Quad 2
8:30 am	Biology A: Apple Snail Symposium.....	Quad 17
8:35 am	Agriculture A.....	Quad 18
8:45 am	Atmospheric & Oceanographic Science A**.....	Quad 11
9:00 am	Anthropology A**.....	Quad 10
	Marine Mammal Stranding Network.....	Crawford 112
10:00 am	Social Science A**.....	Quad 1
10:15 am	Agriculture B**.....	Quad 18
	Biology B**.....	Quad 3
10:30 am	Science Teaching B: 2001 Panel**.....	Quad 2

FRIDAY AFTERNOON, MARCH 23, 1990

1:15 pm	Academy Business Meeting.....	Teaching Pavilion
2:00 pm	Plenary Address I.....	Teaching Pavilion
3:00 pm	Anthropology B: Cedar Keys Symposium.....	Quad 10
	Rare & Endangered Biota (FCREPA).....	Quad 1
	Science Teaching C.....	Quad 2
3:15 pm	Academy Tutorial.....	Teaching Pavilion
	Atmospheric & Oceanographic Science B.....	Quad 11
	Physics & Space Science.....	Quad 18
3:30 pm	Biology C.....	Quad 4
	Biology D.....	Quad 3

FRIDAY EVENING, MARCH 23, 1990

6:30 pm	Academy Social.....	Holiday Inn Oceanfront
7:30 pm	Banquet.....	Holiday Inn Oceanfront
8:30 pm	Plenary Address II.....	Holiday Inn Oceanfront

SATURDAY MORNING, MARCH 24, 1990

8:00 am	Registration (to 9:30 am).....	Gleason Lobby
8:15 am	Biology E.....	Quad 17
8:30 am	Computer Science & Mathematics A.....	Quad 16
	Engineering A: Expanding Your Horizons.....	TBA*
8:45 am	Environmental Chemistry A**.....	Quad 20
	American Association of Physics Teachers**.....	Quad 18
9:30 am	Medical Sciences A**.....	Quad 22
10:45 am	Computer Science & Mathematics B**.....	Quad 16

* To be announced.

** Section Business Meeting follows this session.

ACADEMY TUTORIAL

Friday 3:15 pm Teaching Pavilion P-133
F. Buoni, Florida Institute of Technology, presiding

3:30 pm SPECIAL: Survey of Neural Networks. DONALD W. FAUSETT AND LAURENE V. FAUSETT, Department of Applied Mathematics, Florida Institute of Technology, Melbourne, FL. The field of artificial neural networks is emerging as a major new approach to information processing. An overview of the general concept of neural networks will be presented, and the current state of the art will be indicated. Examples of different types of networks will be described, and areas of application will be discussed. Neural networks are attracting attention from researchers in such diverse fields as psychology, electrical engineering, biology, computer science, physics, neurology, mathematics, cognitive science, operations research, and mechanical engineering.

AGRICULTURAL SCIENCE

Friday 8:35 am Quad 18
SESSION A
J.M. Bennett, University of Florida, presiding

8:35 am D.S. WOFFORD, University of Florida, Welcome and Introductions.

8:45 am AGR-1 Planting Date, Row Spacing and Herbicide Effects on Weeds in Pigeonpea. A. FARES, K.L. BUHR, AND D.G. SHILLING, Department of Agronomy, IFAS, University of Florida, Gainesville 32611. Pigeonpea (*Cajanus cajan* (L.) Millsp) is a promising new crop for Florida and south US. The pigeonpea crop is sensitive to weed competition due to the species' slow seedling development and establishment of canopy cover. Components of this study include the evaluation of the performance of six promising herbicides (Caparol, Lexone, Paraquat, Scepter, Surflan and Zorial), two row spacings (30 and 60 cm) and two planting dates (April and July) on weed biomass in pigeonpea. Results indicate that weed biomass was substantially greater in the July planting, compared to the April planting. Plots with the 30 cm row spacing treatment produced less weed biomass than the 60 cm row spacing. Three to four applications of Paraquat during the growing season, or a single intervention with Scepter resulted in weed biomass reductions of 80 to 100%, compared to the weedy check plots.

9:00 am AGR-2 Row Spacing Effects on Soybean Yield and Net Profit. D. G. WYNNE and C. K. HIEBSCH, Univ. of FL., Agronomy-300 Newell, 0311 IFAS, Gainesville, 32611. The most common spacial arrangement for soybeans in Florida is in rows \leq 36 inches apart. This study was conducted to determine the effect of wide row spacings (60-inch and alternating 30- and 60-inch rows) and hills (30-inch centers) on yield and net return as compared to conventional 30-inch rows. Trials were conducted on farms near Lee and La Crosse for two years using two mid-season soybean cultivars in 1988 and three cultivars (a short-, a mid-, and a long-season cultivar) in 1989. In three of the experiments, the two wide-row patterns had average yields of 80% of the 30-inch rows when averaged across cultivars. In 1989 at La Crosse, wide rows suppressed yields less (compared to 30-inch rows) with taller, later cultivars. Yields of short-, mid-, and long-season soybeans in wide rows were 68%, 84%, and 106%, respectively, of 30-inch rows. Yields of soybeans planted in hills were equal to 30-inch rows. For some management systems, wide rows reduce production costs by a greater fraction than yield, thus increasing net profit per unit.

9:15 am AGR-3 Soybean Production on Reclaimed Phosphatic Clays in South-Central Florida. C. K. HIEBSCH (1), D. B. SHIBLES (2), and J. A. STRICKER (2), (1) Univ. of FL., Agronomy-300 Newell, 0311 IFAS, Gainesville, 32611, (2) Polk County Mined Lands Agricultural Research/Demonstration Project, 4401 Highway 640 West, Bartow, 33830. Soybean planting-date and variety trials have been conducted at the Agrico Research Site from 1986 to 1989 to determine the production potential of and the fundamental management practices for soybeans on reclaimed phosphatic clay soils. Results from trials in 1986 and 1988 indicate that maturity group 6, 7, and 8 cultivars that are adapted to West Florida also produce well at this location, with an average yield of 2560 kg/ha (50% higher than the state average). Delaying planting until after the rains begin may make it impossible to enter the field to plant. Late planting also reduces yields; in 1988 average yields dropped from 2460 kg/ha when planted 29 May to 1730 kg/ha planted on 1 July. The reclaimed phosphatic clay soils have good production potential. Management practices to prevent damage from excessively wet soils, such as good plant establishment before heavy rains, need to be implemented.

9:30 am AGR-4 Ratoon Rice on Phosphatic Settling Pond Clays. J. B. EITZEN (1), D. B. JONES (2), G. M. PRINE (1), and D. SHIBLES, (3) Agronomy Department, IFAS, University of Florida, Gainesville, FL 32611, (2) Everglades Research and Education Center, Belle Glade, FL 33430, (3) Polk County Mined Lands Research/Demonstration Project, 4401 Highway 640W, Bartow, FL 33830. Phosphatic settling pond clays consist mainly of smectites, carbonate-fluorapatite, attapulgite, mica, and other constituents. In early April 1988 and 1989, two rice cultivars were drill planted on these clays in Polk County, Florida. The two cultivars were Gulfmont, a semi-dwarf cultivar, and Lebonnet, a traditional tall cultivar, both with 120 day maturity. Five levels of urea nitrogen (0, 50, 100, 150, and 200 kg/ha) were applied to each of the two cultivars on the main crop. Two biomass samples were taken from the main crop and eight more biomass samples were taken from the ratoon crop over growth phases. Growth analysis of ratoon crop and effects of main crop nitrogen on ratoon crop is reported.

9:45 am AGR-5 Growing Energy Crops on Phosphatic Settling Pond Clay in Polk County. G. M. PRINE (1), J. A. STRICKER (2), and D. B. SHIBLES (2), (1) Agronomy Department, IFAS, University of Florida, Gainesville, FL 32611, (2) Polk County Mined Lands Agricultural Research Center/Demonstration Project, 4401 Highway 640W, Bartow, FL 33830. Elephantgrass (Pennisetum purpureum Schum.) and sugarcane and energycane (Saccharum sp.) were planted in duplicate replications on settling pond clays in September 1986 following an alfalfa cover crop. The biomass yield as measured by one harvest in mid-December each season under an annual fertilization level of 112 kg/ha each of N and K₂O. The average annual dry matter yield averaged over the first two seasons was 34.1, 55.8, 45.6, 47.9, 54.6, 50.8, and 57.0 Mg/ha for PI 300086 elephantgrass, N51 elephantgrass, L79-1002 energycane, US72-1153 energycane, US78-1009 sugarcane, US56-9 sugarcane, and CP72-1210 sugarcane, respectively. Forage and sweet sorghum (Sorghum bicolor (L.) Moench) also had excellent dry matter yields. The high biomass yields of the tall grasses indicates the potential for settling ponds to be major producers of renewable energy as our fossil fuel supplies dwindle.

10:00 am BREAK

Friday 11:30 am Quad 18
BUSINESS MEETING: AGRICULTURAL SCIENCES
D.S. Wofford, University of Florida, presiding

Friday 1:00 pm Teaching Pavilion
ANNUAL BUSINESS MEETING: FLORIDA ACADEMY OF SCIENCES
and Plenary Address I

Friday 3:15 pm Teaching Pavilion
ACADEMY TUTORIAL: SURVEY OF NEURAL NETWORKS

Friday 10:15 am Quad 18

SESSION B

D.S. Wofford, University of Florida, presiding

10:15 am AGR-6 Effects of Fertilization and Management on the Production of Mott Elephantgrass (*Pennisetum purpureum* Schum.). J. R. KNETTLE (1), G. M. PRINE (1), O. C. RUELKE (1), L. E. SOLLENBERGER (1), and C. R. STAPLES (2), (1) Agronomy Dept., (2) Dairy Science Dept., IFAS, Univ. of Florida, Gainesville 32611. Cutting frequency, stubble height, and levels of fertilization on Mott elephantgrass (*Pennisetum purpureum* Schum.) were studied for two years. Four different cutting frequencies (2, 3, 4, and 6 times per year) vs. two nitrogen fertilizer rates (179 and 358 kgN/ha/yr) and cutting frequency vs. three stubble heights (2.5 and 20 cm and above growing point) were studied for effect on dry matter yield, IVOMD, nitrogen recovery, and crude protein percentages and dry matter yields. Dry matter yields increased up to 358 kgN/ha/yr N rate over all harvest frequencies. Crude protein percentage increased with more frequent harvests and with higher applications of N fertilizer. Percentage of N recovery was greater at the lower rate of nitrogen. There was no difference in percentage of IVOMD in response to increasing N level. Increased frequency of harvests decreased forage yield, increased percentage of IVOMD but did not affect IVOMD yield.

10:30 am AGR-7 Water Management Effects on Alyceclover. C. W. MANSFIELD (1), J. M. BENNETT (1), AND D. D. BALTENSBERGER (2), (1) Agronomy Dept., IFAS, Univ. of Florida, Gainesville 32611, (2) Panhandle Res. and Ext. Cntr., Univ. of Nebraska, Scottsbluff, NE 69361. Common alyceclover (*Alysicarpus vaginalis* L. DC) was subjected to the following water management treatments to evaluate physiological responses, dry matter production and partitioning, and forage nutritive value: 1) well-watered (WW), irrigated every 3 to 5 days during periods without rainfall; 2) cyclical stress (CS), irrigated after 2 weeks without rainfall; and 3) rainfed (RF), no irrigation. Water stress reduced single leaf carbon exchange rate, stomatal conductance, and transpiration by an average of 63, 81, and 53%, respectively, after 12 days without irrigation or rainfall. Dry matter yield was reduced 57 and 72% as a result of the CS and RF treatments, respectively. Whole plant *in vitro* digestibility was 13% lower in the WW treatment as compared to the average of the CS and RF treatments. Alyceclover was quite sensitive to water stress and required frequent irrigation or rainfall for maximum productivity.

10:45 am AGR-8 Container Shape Influences Growth of Weeping Fig. G. J. WRIGHT AND D. B. MCCONNELL, Department of Ornamental Horticulture, IFAS, University of Florida, Gainesville 32611. Rooted *Ficus benjamina* cuttings were planted in containers of 4 different shapes or four different depth to diameter ratios to determine the effect of container shape or depth on the root growth and distribution pattern. The first experiment used standard 10 cm (4") containers, a square, a three sided inverted pyramid and a four sided inverted pyramid, all having a constant volume of 450 ml. Square containers had increased top growth and decreased root growth. The pyramids had decreased top plant growth but increased root growth. Trials were conducted to determine evaporative losses from the different container shapes. The depth to diameter experiment produced expected correlations between surface area and evaporative loss. Three substrates used in the initial evaporation loss trial showed little difference in percentage water loss by evaporation irrespective of substrate type. Root distribution patterns were influenced by the container shape with greater vertical growth in deeper containers.

11:00 am AGR-9 Resistance to *Cylindrocladium crotalariae* in White Clover. A. Amaya, D.S. Wofford and K.H. Quesenberry. Dept. of Agronomy, IFAS, Univ. of Florida, Gainesville 32611. White clover (*Trifolium repens* L.) has recently been found to be susceptible to black root-rot disease caused by *Cylindrocladium crotalariae*. This study was undertaken to develop a screening technique for evaluation of genetic

resistance in Florida germplasm and use this method to identify genotypes with resistance. The initial experiment was designed to determine the inoculum concentration and disease incubation period necessary for accurate assessment of resistance. Four inoculum suspensions were used and inoculated plants were monitored by weekly plant counts for a 6 week period. The results indicated that conidial suspensions prepared from 1 PDA culture in 100 ml of water were most effective. No differences in plant counts were detected after the 4 week incubation period, therefore the aforementioned inoculum level and this incubation period were used for evaluation of progenies of 200 elite genotypes. Preliminary results suggest a heritable level of tolerance to black root-rot exists which should be amenable to improvement via recurrent selection.

11:15 am AGR-10 Effect of Explant Source on Callus Growth and Shoot Regeneration in Desmodium. P. A. Krottje, D. S. Wofford, and K. H. Quesenberry. Agronomy Department, IFAS, University of Florida, Gainesville, FL 32611. Desmodium (*Desmodium* spp.) is a widely distributed tropical legume with considerable potential as a forage crop for Florida. Tissue culture of desmodium using hypocotyl explants has revealed extreme variation among genotypes with respect to callus growth and plantlet regeneration. The objectives of this experiment were to determine if genotypic variation is consistent for different explant sources and to identify the most suitable explant source for future work. Leaf discs, petioles, hypocotyls, and cotyledons were evaluated for each of four genotypes. Explants were cultured on L2-based callus growth medium for 28 days and subcultured to L2 shoot induction medium. Each explant-genotype combination was rated for callus growth, callus appearance, and shoot regeneration. Significant genotype, explant, and genotype x explant effects were observed for all parameters. Visual characterization of regenerable versus nonregenerable callus will be discussed.

Friday 11:30 am Quad 18
BUSINESS MEETING: AGRICULTURAL SCIENCES
D.S. Wofford, University of Florida, presiding

Friday 1:00 pm Teaching Pavilion
ANNUAL BUSINESS MEETING: FLORIDA ACADEMY OF SCIENCES
and Plenary Address I

ANTHROPOLOGICAL SCIENCES

Friday 9:00 am Quad 10
SESSION A: Archaeological and Medical Anthropology
J.M. Chernela, Florida International University, presiding

9:00 am ANS-1 Assessment of Cortical Thickness by Computed Tomography in an Early Archaic skeletal Sample from Windover (8Br246). A.M. ESTES, Department of Anthropology, Florida State University, Tallahassee, FL 32306. The Windover archaeological site is an ARchaic mortuary pond dated to about 7,500 years BP. The Nordin and anterior-posterior (AP) indices were calculated utilizing computed tomography images of femoral cross-sections. These two indices made it possible to differentiate between age and diet-induced cortical involution among the Windover individuals. Results indicate that individuals in this population had levels of activity and nutrition which were adequate for maintaining normal bone mass throughout the life span. The study also highlights the role of the AP index as an indicator of age-induced cortical bone loss, and confirms that bone loss in later years is sex related. The results additionally point to the similarity of bone dynamics in prehistoric populations and modern groups.

9:15 am ANS-2 Preliminary Report on the Subadult Dentition of Early Archaic Indians in Central Florida. JOHN T. BARTON, Department of Anthropology, Florida State University, Tallahassee, FL 32306. The subadult dentition of 51 individuals is examined using mesiodistal, buccolingual, and cusp height measurements. This sample population is from the Windover site (between 7,000 and 8,000 B.P.) located near Titusville, Florida. Comparisons of left vs. right dentition as well as upper vs. lower dentition are made. This Hunter-Gatherer sample is statistically compared to other populations, including middle Archaic, Woodland, Mississippian, Historic, and modern European and aboriginal New World populations. Based on this study, the early Florida dentition appears larger than later populations. The author would gratefully like to acknowledge the guidance and assistance of Dr. Glen Doran of Florida State University.

9:30 am ANS-3 Archaeological Discoveries in the Okeechobee Basin via Early Aerial Photography. WILLIAM GRAY JOHNSON, Florida Museum of Natural History, Dept. of Anthropology, Gainesville 32611. Large prehistoric earthworks have long been known in the Okeechobee Basin of South Florida. Circular ditches, linear embankments, and mounds of various sizes and shapes are found in combinations that form elaborate ceremonial centers. Some of these were discovered prior to the development of aerial photography. However, since its invention, many more have been recorded. A recent review of the earliest aerial photographs of the west side of the Okeechobee Basin has revealed still more of these well-known earthwork shapes and previously unknown types: squares and rectangles. Though their function(s) remain elusive, their presence strongly suggests a connection between the prehistoric peoples of the Okeechobee Basin and the Ohio Valley.

9:45 am ANS-4 Archaeological Investigations at St. George's Island: A Shell Midden. JOHN T. BARTON. Bellamy Building, Department of Anthropology, Florida State University, Tallahassee, Florida 32306. A shell midden containing pottery from the Swift Creek, Lamar, and Fort Walton (and possibly other periods) is examined. Comparisons are made with inland Fort Walton sites in the Red Hills area. This study is based on the analysis of ceramics, lithic, shell, and faunal materials. An attempt is made to determine seasonality, indicating whether this was a year-round or seasonal camp. Special thanks to Dr. Rochelle Marrinan, Dr. Glen Doran, and Dr. Steve Hale for their assistance.

10:00 am BREAK

BREAK POSTER: X-Ray Imaging of Skeletal Remains: Beyond Surface Matters. J.S. RICHARDSON, 1319 McClelland Avenue, Port St. Joe 32456.

10:15 am ANS-5 Season of Occupation Determination Utilizing Sclerochronology for Two Sites on Florida's West Coast. PAUL L. JONES, University of Florida, Department of Anthropology, Gainesville, FL 32601. Samples of southern quahogs, Mercenaria campechiensis, were excavated from archaeological shell middens at two locations in the Cedar Keys National Wildlife Refuge. Quahog shells provide seasonal markers in their shell growth patterns which correspond to changes in their aquatic environment. These markers form distinct patterns of growth for different seasons of the year. When the markers from the archaeological specimens were compared against the modern sample of N = 228 specimens from the same area, season of death could be determined. The archaeological specimens examined in this study indicated that at the North Key site (8Lv65) the harvest of Mercenaria took place at all seasons of the year, while the specimens from the Seahorse Key site (8Lv65) proved to be inconclusive.

10:30 am ANS-6 Settlement and Social Complexity in the Everglade: An Analysis of Subsistence Remains from the Honey Hill Site (8Bd411) in a Regional Perspective. MARILYN A. MASSON, Department of Anthropology, Florida State University, Tallahassee, FL 32306. Middens of South Florida contain data which represent the evolution of social complexity. Determining degrees of population density and sedentism in prehistoric times are important questions related to social process. The results of an analysis of subsistence remains from the Honey Hill site (8Bd411), located on the Atlantic Coastal Ridge at the eastern periphery of the Everglades are presented. These data are compared to midden analyses from other South Florida sites, and the degree of prehistoric sedentism is addressed. The proportions of seasonally available vs. year round species are compared and a procurement continuum from coastal to inland sites is outlined. The proposition that sites were more densely and permanently inhabited prior to historic times is tested.

10:45 am ANS-7 Subsistence and Settlement Patterns on the East Coast of Florida: The Role of Cultivated Plants. W.M. STANTON, Florida State University, Department of Anthropology, Tallahassee, FL 32306-2023. From post-Archaic times to the historic period the natives of east Florida are believed to have been a population of hunter-fisher-gathers, who moved between the coast and the interior in a seasonal cycle in order to exploit various food resources in the area. Additionally, certain groups are also known to have cultivated various crops such as maize on a scale that has never been fully understood. A review of settlement patterns and subsistence data will attempt to provide a clearer understanding of the role of cultivated plants in the diet of the east Florida population. Geographic and chronological patterns will be assessed using data obtained from sites on the east coast of Florida.

11:00 am ANS-8 Food Classification and Consumption Patterns among Rural Black Female Diabetics in Alachua County. N.E. SCHOENBERG, Dep't of Anthropology, Univ. of Florida, Gainesville 32611. This study investigates food beliefs and consumption patterns among Black, middle aged diabetics living in rural Alachua County. Dietary card sorts, food models, and food frequency surveys provide information on dietary intake and perceptions of fat and sugar content of foods. By comparing the women's self-reported food consumption with their designation of "healthy" versus "unhealthy" foods, the convergence between intake modification and belief can be determined. Factors influential in this convergence include information accessibility, education, age and economic status. This study considers cultural context as extremely influential rather than assuming all diabetics perceive of and consume food uniformly.

11:15 am ANS-9 Commercial Fishing: Is it an occupational hazard? M.E. JEPSON, Department of Anthropology, University of Florida, Gainesville. Commercial fishermen have long valued their independence and have been optimistic toward their future. They often show a commitment toward their occupation that makes it seem more a lifestyle than merely a job. With increasing regulation, over-fishing, pollution, and increased competition for the same resources, fishermen along the Gulf coast see this lifestyle as being threatened. Because they tend to show more commitment to their work and often do not have the time to take part in local or regional affairs, fishermen may react differently in the face of increasing regulation. Policy-makers need to take this into consideration for fair, effective, and sound policy. Methods for attaining this type of policy will be discussed.

11:45 am QUAD 10

BUSINESS MEETING: ANTHROPOLOGICAL SCIENCES

J.M. Chernela, Florida International University, presiding

Friday 1:00 pm Teaching Pavilion

ANNUAL BUSINESS MEETING: FLORIDA ACADEMY OF SCIENCES

and Plenary Address I

Friday 3:00 pm Quad 10

SESSION B: SYMPOSIUM - "Human Maritime Adaptations in the Cedar Keys, Florida"

N.T. Borremans, University of Florida, presiding

3:00 pm ANS-10 Annual Incremental Shell Formation in the Southern Quahog, *Mercenaria campechiensis*, from Suwannee Reef, Florida, and Its Use in Determining the Paleoseasonality of Archaeological Shell Middens. I. QUITMYER, D. JONES, AND N. BORREMANS, Florida Museum of Natural History, Gainesville 32611. Analysis of a monthly collection (n=279) of living southern quahogs through the annual (1987-88) cycle from Suwannee Reef, verifies previous research that shows quahog shells form translucent and opaque growth increments that mark the seasons of the year. The ability to correlate the periodicity of incremental shell formation with the seasons of the year is an important first step in understanding the paleoseasonality of archaeological shell middens in the Cedar Keys region. When this contemporary model of incremental shell formation is compared to quahog shells from archaeological contexts a year-round period of quahog harvest is implied for sites dating to the Weeden Island Period (ca. A.D. 300-800).

3:15 pm ANS-11 A Modern Fishing Method in Cedar Key. M. A. MASSARO, University of Florida, 1350 Turlington Hall, Gainesville 32611. The targeting of specific species of fish has greatly influenced modern capture methods. An ideographic study of one Cedar Key area fisherman investigates a sampling of cast-netting techniques. It provides descriptions of equipment and casting procedure, and it briefly evaluates the success off each catch. A supplementary focus discusses general and seasonal variations, based on the personal experience of the fisherman.

3:30 pm ANS-12 Pedological Investigations of Shell Midden Site Formation in the Cedar Keys Wildlife Refuge. A. S. SWIFT, University of Florida, 1350 Turlington Hall, Gainesville 32611. As part of the archaeological investigations in the Cedar Keys region, pedological techniques were employed to study the impact of prehistoric human occupation on soil development. Length and intensity of occupation produced specific changes in soil chemistry, and site formation processes can be inferred from textural gradations. Soil samples were taken from strata throughout A.B.'s Midden (8LV65), a shell bearing site on North Key. These samples were analyzed for their phosphate content, pH, and particle size distribution. Results were compared for intra-site variation, and archaeological soils were compared with natural soils on North Key.

3:45 pm ANS-13 Prehistoric Settlement Patterns in the Gulf Hammock Area of Florida's North Central Gulf Coast: A Research Design. P. L. JONES, University of Florida, 1350 Turlington Hall, Gainesville 32611. This paper presents a research design for an archaeological survey of the Gulf Hammock area of the Florida Gulf coast between the Cedar Keys and the Wacassassa River. Preliminary research and reconnaissance by a team of University of Florida archaeologists has revealed numerous small sites, both shell middens and sand burial mounds bordering fresh water and brackish creeks and ponds. The project will investigate prehistoric settlement patterns with respect to the distribution

of sites within defined environmental zones. The survey methodology employs the generation of predictive site location model to be tested with systematic ground truthing in order to locate and evaluate sites in this little known and previously unsurveyed area.

4:00 pm ANS-14 Prehistoric Human Settlement and Paleogeography in the Cedar Keys Region, Florida. N. T. BORREMANS, University of Florida, 1350 Turlington Hall, Gainesville 32611. The aquatic resources of the Florida Gulf coast have supported human maritime economies for many thousands of years. Results of formal archaeological testing and systematic survey along a 12 kilometer coastal corridor in the Cedar Keys region of the north peninsular Gulf coast provide evidence of a large well-integrated prehistoric population of settled fisher-foragers. Over 50 island properties defined by marsh or open water were examined and tested, yielding evidence of more than 50 prehistoric shell midden sites. Elements addressed in this paper include (1) prehistoric use of estuarine resources, (2) the geographic distribution of shell middens and shell-free sites, (3) midden erosion due to rising sea level, and (4) the impacts of these elements, both positive and negative. This project was funded in part by grant-in-aid assistance from the Fla. Division of Historical Resources.

ATMOSPHERIC AND OCEANOGRAPHIC SCIENCES

Friday 8:45 am Quad 11

SESSION A

G.A. Zarillo, Florida Institute of Technology, presiding

8:45 am AOS-1 Assessing Nutrient Limitation of Phytoplankton Primary Productivity in the Little Manatee River and Tampa Bay. D.L. HOWARD AND G.A. VARGO, Univ. of S. Florida, 140 Seventh Ave. S., St. Petersburg 33701. Supported by FDER/SWFWM. Nutrient limitation of short-term potential photosynthesis was assessed by determining the inhibition or enhancement of carbon-14 uptake after the addition of nitrate and/or phosphate in the light and ammonium enhanced dark uptake. Nutrient additions resulted in a trend for a reduction in photosynthesis, however, the differences between samples with and without nutrient addition were not significant. The productivity indices ($\text{mgC mgChl}^{-1} \text{hr}^{-1}$) were always greater than 8 in Tampa Bay and the Little Manatee River, which are indicative of nutrient sufficient populations. Relationships between photosynthesis and biomass for two of three river stations and Tampa Bay support this view. Therefore, short-term potential photosynthesis does not appear to be nutrient limited.

9:00 am AOS-2 Dissolved and particulate chemical composition ratios in the Little Manatee River and Tampa Bay. G.A. VARGO (1), AND M.S. FLANNERY (2), (Dept. of Mar. Sci., Univ. of S. Florida, 140 Seventh Ave. S., St. Petersburg 33701, (2) Southwest Florida Water Management District, 2379 Broad St., Brooksville 34609. Supported by FDER/SWFWM. Annual averages of the atomic ratios of dissolved nitrate and total inorganic nitrogen to phosphate in Tampa Bay were 0.17 and 0.51 respectively; while values in the river at 12% were 0.67 and 1.2, respectively. Such low ratios suggest potential strong nitrogen limitation of phytoplankton growth. Conversely, annual averages of particulate atomic ratios of C:N:P of 58:6.3:1 and 69:8.5:1 for Tampa Bay and 12% respectively indicate phosphorus enrichment and borderline N-limited to N-replete populations. Particulate C:Chl, N:Chl, the productivity index and relationships between potential production and biomass are also indicative of N-replete populations.

9:15 am AOS-3 Effect of N Addition on Phytoplankton Biomass in the Little Manatee River and Tampa Bay. P. RODRIGUEZ AND G.A. VARGO, Univ. of S. Florida, Dept. of Mar. Sci., 140 Seventh Ave. So., St. Petersburg 33701. Supported by SWIM. Data from previous studies of the LMR and Tampa Bay phytoplankton population indicated that short-term, potential photosynthesis was not nutrient limited. After addition of a range of nitrogen concentrations in the LMR (12%) and Tampa Bay, biomass increased as indicated by the increment in chlorophyll, carbon and nitrogen. Furthermore, growth rates were correlated with the amount of nitrogen supplied without significant differences between stations. Size fractionation of these populations yielded a higher biomass and production in the $>12\mu\text{m}$ fraction. Silica, added with and without nitrogen, did not increase yield. This study suggests that if steady-state populations do not exhibit indications of nutrient limitation, this does not imply that limitation of longer-term growth or biomass could not occur. Since N addition alone increased yield, other growth factors were not limiting.

9:30 am AOS-4 Methylamine Uptake by Tampa Bay Phytoplankton. T.H. ORSOY AND G.A. VARGO, Department of Marine Science, University of South Florida, 140 Seventh Ave. S., St. Petersburg 33701. Supported by the SWIM Program. The Tampa Bay estuary represents a unique "nitrogen limited" ecosystem primarily due to natural and anthropogenically induced phosphate eutrophication. In an attempt to better understand nutrient utilization by Tampa Bay phytoplankton, concentration dependent ammonium uptake was assessed using ^{14}C labelled methylamine, an ammonium analogue. Simultaneous experiments to quantify dark uptake and ambient ammonia inhibition of methylamine uptake were also performed. Samples were collected from upper and lower Tampa Bay on a monthly basis in order to evaluate spatial and temporal heterogeneity in the system. Similar uptake rates were measured at both sites during September and October with marked reductions in uptake during November. Dark uptake was minimal while 1 and 5 μM ammonium concentrations caused 55 and 73% average reductions in methylamine uptake following 15-20 min. incubations.

9:45 am AOS-5 Size Fractionated Primary Production in a Tampa Bay Estuary. R.W. RICHARDSON AND G.A. VARGO. Univ. of S. Florida, Dept. of Mar. Sci., 140 Seventh Ave. S., St. Petersburg 33701. Supported by the SWIM Program. Phytoplankton studies of the Little Manatee River (LMR) for 1988 suggested a community characterized by numerically abundant microflagellate populations. A second study (1989) assessed the production and biomass of specific size classes of phytoplankton in Tampa Bay and the Little Manatee River (12%). To date, in Tampa Bay, the $>12\mu\text{m}$ size fraction represented an average of 81% and 27% of the biomass and production, respectively; while at 12% values were 50% and 27% respectively. The $<5\mu\text{m}$ size fraction contributed less than 10% of the biomass in Tampa Bay for 5 of 9 months whereas at 12% it contributed $>25\%$ of the biomass for 7 of 9 months. Assimilation numbers for the $<5\mu\text{m}$ size fraction for both Tampa Bay and 12% suggest that populations had a higher photosynthetic efficiency than all other size fractions. Therefore, the smaller size fraction appears to be both numerically and physiologically important in the LMR compared to Tampa Bay.

10:00 am BREAK

10:15 am AOS-6 The Role of Temperature, Salinity, and Light on the Seasonality of Dinoflagellates Associated with Ciguatera. S.L. MORTON AND D.R. NORRIS, Florida Institute of Technology, Dept. of Oceanography and Ocean Engineering, Melbourne, FL 32901. The growth rates of eight different species of toxic dinoflagellates associated with the tropical fish disease, ciguatera, were measured under a gradient of temperature, salinity, and light intensity. The optimum growth rates for each species is compared to ecological studies to determine salient abiotic factors that influence the seasonality of these select dinoflagellates.

10:30 am AOS-7 Spatial and Seasonal Distribution Patterns, and the Ecological Role of Mysidacea at Melbourne Beach and Vero Beach. ALAN HINTZ, Dept. of Oceanography and Ocean Engineering, Florida Inst. of Technology, Melbourne 32901. Sampling of the nearshore mysids at Vero and Melbourne Beach indicate that Bowmaniella floridana, B. brasiliensis, and Metamysidopsis swifti occur nearshore throughout the year. Mean densities determined from daytime sampling at Melbourne Beach ranged from 80 - 3000 mysids per 30' tow with peaks occurring in March and October, 1989. Mean densities at Vero Beach ranged from 80 - 500 mysids per 30' tow. Seasonal characteristics such as: reproduction times, fluctuations in population density and size distributions, sex characteristics such as fecundity and male - female sex ratios, age class patchiness, vertical migration, and diet will be examined.

10:45 am AOS-8 The Partitioning Behavior of Polycyclic Aromatic Hydrocarbons Associated with Coal and Oil Ash Waste Products Which Have Been Used to Construct an Artificial Reef. ROBERT FREASE AND JOHN G. WINDSOR, JR., Dept. of Oceanography & Ocean Engineering, Florida Inst. of Technology, 150 West University Boulevard, Melbourne, 32901-6988. Polycyclic aromatic hydrocarbons (PAH) have been found to be associated with residues from coal and oil-fired electric power plants. Disposal procedures for incineration wastes include dumping ashes in landfills, mines or the sea. The capacity of these ashes for retaining PAH is of great importance when considering disposal options for the ash.. The partitioning behavior of a selected number of PAH associated with the ash material used to construct an artificial reef have been examined for both short and long term leaching experiments. Partitioning behavior of PAH and this ash have been found to be similar to others reported in the scientific literature. Polycyclic aromatic hydrocarbons are strongly bound to the ashes and are difficult to remove to aqueous solutions. Support for these investigations has come from Dr. J. Ross Wilcox and Florida Power & Light Co.

10:00 am AOS-9 Effects of Stabilized Incineration Ash on Selected Marine and Estuarine Phytoplankton. H. A. BEADLE AND, D. R. NORRIS, Florida Inst. of Tech., Dept. of Oceanography and Ocean Engineering, Melbourne 32901. Leachate and elutriate experiments examine the potential toxic response of four phytoplankton species to artificial reef units of stabilized municipal solid waste incineration ash. Analysis of variance will be used to determine if the rate of population growth after 96-hour exposure to leachate/elutriate differs from that of the control population. Findings to date, show growth inhibition occurs in the most sensitive species, Thalassiosira oceanica, when exposed to leachate from a stabilized 100% bottom ash mixture. Results from this research will be a factor in determining if construction of artificial reefs with municipal solid waste incineration ash is an economical and environmentally sound alternative to landfill disposal.'

11:15 am AOS-10 Effects of stabilized oil ash reefs on the benthic infaunal community. J.L. Rodda and W.G. Nelson. Department of Oceanography and Ocean Engineering, Florida Institute of Technology, Melbourne, FL 32901. In April 1987 artificial reefs of stabilized oil ash were installed off Vero Beach, FL. Six benthic core samples were collected at each of 6 sites (2 stabilized oil ash reefs, 2 concrete reefs, and 2 control areas) on 8 dates ranging from 4 to 15 months after reef installation. Both reef types had fewer individuals/core than controls after both 4 and 15 months. No significant differences in animal abundance between reef types were found after either 4 or 15 months. Both reef types showed a decreased number of benthic infauna within 1 meter of the reef. It is proposed that fish feeding tends to occur closer to the reef structures, accounting for the lower number of infaunal animals near the reefs. Thus, from the data analyzed to date, there is no evidence that stabilized oil ash reefs have a negative effect on the benthic infaunal community.

Friday 11:30 am Quad 11
BUSINESS MEETING: ATMOSPHERIC AND OCEANOGRAPHIC SCIENCES
G.A. Zarillo, Florida Institute of Technology, presiding

Friday 1:00 pm Teaching Pavilion
ANNUAL BUSINESS MEETING: FLORIDA ACADEMY OF SCIENCES
and Plenary Address I

Friday 3:15 pm Quad 11
SESSION B
J.J. Windsor, Jr., Florida Institute of Technology, presiding

3:15 pm AOS-11 The Effect of Storm Events on Turbidity and Phosphate Levels in Turkey Creek. BILLIE WEBB and RICHARD BOURGERIE, Department of Oceanography and Ocean Engineering, Florida Institute of Technology, 150 W. University Boulevard, Melbourne, Florida 32901. Water samples were taken from Turkey Creek, Florida and analyzed for phosphate concentrations and turbidity levels. Samples were taken during periods of little to no rainfall, and shortly after rainfall events. The phosphate concentrations were around $1\mu\text{M}$ during non-storm periods. These values decreased with rainfall. Storm input had an opposite effect on turbidity levels. Turbidity was low during periods of no rainfall and increased shortly after storms.

3:30 pm AOS-12 Comparisons of Habitat Value Between the Seagrass, Halodule wrightii and the Alga, Caulerpa prolifera. M.J KEHL(1), R.W.VIRNSTEIN(2), AND W.G. NELSON(1). (1) Florida Institute of Technology, Melbourne 32907. (2) St. John's River Water Management Dist. Palatka 32177. Four sampling methods were used to compare habitat preference for four faunal assemblages in the Banana River Lagoon, Florida. Results show that Halodule contained a greater number of individuals for dip net samples in July and November, epifaunal and benthic samples in November, and fishtrap samples in July, November and August. Caulerpa contained a greater number of individuals for dip net samples in February, epifaunal and benthic samples in July and February, and fish trap samples in February. Significant differences ($P < 0.05$) were found between plant types (Halodule vs. Caulerpa) for 23 samples. Significant differences ($P < 0.05$) between sampling sites were found on 20 occasions.

3:45 pm AOS-13 Water Quality Monitoring in the Indian River Lagoon: Where Do We Go From Here? JOHN G. WINDSOR, JR., Dept. of Oceanography & Ocean Engineering, Florida Inst. of Technology, Melbourne, 32901-6988. A brief summary of water quality monitoring techniques for the Indian River lagoon will be followed by a discussion of the value of other sources of water quality data. Previously, the impacts of storm events and efforts necessary to demonstrate those effects have been presented. The summer Marine Field Projects Program and Estuarine Operations Data Base at F.I.T. contribute to a better understanding of variations in water quality parameters in the lagoon. The focus of these studies is in the north central segment of the Indian River Lagoon. Questions addressed include: How representative is water quality sampling?, Is a midwater (depth) sample representative of the whole water column? Is a channel sample representative of a whole lagoon segment?, and What impacts do controlled releases of freshwater have on the lagoon. A citizens monitoring network may be of value in collecting water quality data. Support for these studies come from the Dept. of Oceanography & Ocean Engineering at F.I.T.

4:00 pm AOS-14 Satellite Remote Sensing of Suspended Sediments in Florida Waters. R. P. STUMPF, U.S. Geological Survey, 600 4th St. South, St. Petersburg 33701. Remote sensing can be used to give reproducible estimates of suspended sediment concentrations and the diffuse attenuation coefficient in turbid estuarine waters. Some capability exists to estimate chlorophyll in these waters as well. The major constraint on the use of these techniques in Florida's coastal waters is the interference caused by light reflecting from the bottom. The bottom effect is a function of the absolute clarity of the water, the absorption by pigments such as humic acids, the water depth, and the bottom reflectance. Use of longer wavelength light such as red and near-IR will reduce both the bottom effect and the effect of humic acids on the remotely observed signal.

4:15 pm AOS-15 Utilization of Watershed Land Use Maps to Assess Stormwater Run-off into Estuarine Waters. H. M. SWAIN, V. L. LARSON, AND A. M. JACKSON, Marine Resources Council, 150 W. University Blvd., Melbourne 32901. Land use maps, based on aerial photo interpretation, have been constructed for the majority of the watershed of the Indian River Lagoon, East Central Florida. The preparation of the land use maps is described and their scope and coverage discussed. The methodology for compiling the data into an ARC INFO Geographical Information System is outlined. The techniques for utilizing these land use maps to determine the quality and quantity of stormwater run-off are examined. Particular emphasis is paid to analyses using the Geographical Information System.

4:30 pm AOS-16 Estuarine Management - A Guide for Research Design, Planning and Implementation. D. D. BARILE AND E. A. MOORE, Marine Resources Council of East Florida, 150 W. University Blvd., Melbourne 32901. A tops down management and planning program design is presented formulated to provide information for the decision-making process, the program integrated research, information gathering, storage and dissemination as well as estuarine resource planning for implementation through conservation retrofitting and resource use. The program is based upon systems analysis, watershed management and a hierarchical or tops down program design. Project planning for the Indian River Lagoon under the SWIM program is presented as the model for process.

NOTES

BIOLOGICAL SCIENCES

Friday 8:30 am QUAD 17

SESSION A: SYMPOSIUM - "Biology and Management of the Florida Apple Snail"
R.L. Turner, Florida Institute of Technology, presiding

8:30 am R.L. TURNER, Welcome and Introductions

8:45 am BIO-1 Adaptation of a Portable Dredge Technique to Field Census of Pomacea paludosa. E. R. RICH AND O. T. OWRE, University of Miami, P.O. Box 249118, Coral Gables, FL 33124. Direct censusing of Pomacea paludosa in the tangle of vegetation, litter and muck of the Everglades is singularly difficult. This is a major reason for the paucity of demographic information on this important organism. Although the egg masses are evident they are strongly seasonal and at best only an indicator of snail populations. A portable suction dredge operating on the Venturi principle developed for marine benthic sampling was adapted for Pomacea sampling and tested in the Conservation Areas of the Everglades. The accuracy and precision were evaluated by spiking and successive sampling in shallow areas. The results were correlated with other population indices.

9:00 am BIO-2 Apple Snail Densities at Alexander Springs, Lake County, and Observations on Snail Ecology. D. C. Bryan, Florida Park Service, 3900 Commonwealth Boulevard, Tallahassee 32399. Research was conducted while author was affiliated with Tall Timbers Research Station, Tallahassee. While studying Limkins (Aramus guarauna) in spring-fed rivers, apple snails and other prey species were censused by hand-searching river bottom quadrants. Densities decreased remarkably from quadrants located in Vallisneria beds, to those under Eichornia and Pistia mats, to those in unvegetated areas. Ecological considerations include herbicide management of floating vegetation. Size differences of snails in different spring systems are also discussed.

9:15 am BIO-3 Observations on Feeding by Pomacea paludosa. E. R. RICH, University of Miami, P.O. Box 249118, Coral Gables, FL 33124. Preliminary studies on feeding in nature and laboratory have included gut content analysis, stable isotope ratio measurement of snail tissue and dietary components, gut passage rates, and feeding rates as function of size and temperature. Gut content analysis indicated that periphyton was a major food component but this is at odds with the stable isotope data which indicates that vascular plants are the major contributor to snail tissue. Laboratory studies indicated that periphyton has low preference standing for various sizes of laboratory raised snails.

9:30 am BIO-4 A Comparison of Pomacea Paludosa Eggs to Other Species of Pomacea. BEATRICE E. WINNER 342 Southwind Drive 101 North Palm Beach, FL 33408. The eggs of Pomacea differ in shape, color and size to two other species of Pomacea, P. bridgesi, and P. haustorium. A difference can readily be seen in the newly hatched snails. Colored slides will be shown of the adult snails, eggs and newly hatched snails.

9:45 am BIO-5 Hydric Relations of Terrestrial Eggs of the Florida Apple Snail, Pomacea paludosa. R. L. TURNER, T. C. DiNOTO, AND C. M. McCABE, Dept. Biol. Sci., Fla. Inst. Technol., 150 W. University Blvd., Melbourne 32901. The Florida apple snail lays clutches of jellied eggs on cattails and other emergent substrata. After the extracapsular jelly dries, egg contents are subject to desiccation during 2-3 wk of embryogenesis. This study was to document changes in hydration during incubation. Within 24 h after oviposition, seven clutches held under uncontrolled laboratory conditions lost 40% wet weight (WW) as the extracapsular jelly dried. Rate of loss declined over the next 32 d to 0.6%/d based on original WW or 1.0%/d based on WW at 24 h. Clutches incubated at controlled relative humidities (RH) lost water inversely with RH. E.g., eggs held at 85% RH lost 10-12% WW, and those held at 0% RH lost 27-37% WW from days 2 to 27 of incubation; loss was not related to embryonic viability or body weight. In water loss, apple snail eggs are more similar to the cleidoic avian egg than to non-cleidoic reptilian eggs; but they lose substantially more water than bird eggs, perhaps due to the smaller size of snail eggs.

10:00 am BIO-6 Ultrastructure of the Capsule Gland Duct in Pomacea paludosa. G. W. HINSCH AND P. E. VERMEIRE, Dept. Biology, U. South Florida, Tampa 33620. The female reproductive system of Pomacea paludosa consists of the ovary, oviduct, seminal receptacle, bursa copulatrix, capsule gland and albumen gland. The duct of the capsule gland coils through the anterior albumen gland. The epithelium is composed of two layers of either secretory or ciliated non-secretory cells. The opposing faces of the epithelial cells produce different secretion products which is reflected in differences in cellular ultrastructure of the two epithelia. The cells of the posterior face produce a protein as well as some mucopolysaccharide while those of the anterior face secrete protein and non-sulfated mucopolysaccharides.

10:15 am BREAK

10:30 am BIO-7 Anatomy and Morphometry of Pomacea paludosa: a Medically and Economically Interesting Snail. G. PERERA, M. YONG, J. R. FERRER, AND R. VELO, Laboratorio de Malacologia, Ave. 15 y calle 200, Siboney, Havana, Cuba. Anatomic studies of Pomacea paludosa, a species that was only known from the conchological standpoint, were carried out. These studies led to the establishment of the characteristics of the male reproductive system. The penis has a flagellum shape, and it is rolled at the end of the penis sac. Unlike other species of the genus, P. paludosa has only one internal gland, and the osphradium has nine arborescent excrescences. Morphometrical studies, done with specimens from four localities, showed significant differences among them according to the length of the spire. This was corroborated by an analysis of variance and Duncan's test. In spite of these differences, the anatomical characteristics show that they belong to the same species and that the differences may be due to physical or climatic changes or to the food source available in each habitat.

10:45 am BIO-8 Growth Studies of Some Freshwater Prosobranchs from the West Indies. J. P. POINTIER¹, J. R. FERRER², M. YONG², AND G. PERERA², (1) Centre de Biologie et d'Ecologie Tropicale et Mediterranee, Ecole Pratique des Hautes Etudes, Laboratoire de Biologie Marine et Malacologie, Ave. Villeneuve, 66025 Perpignan, France; (2) Laboratorio de Malacologia, Instituto de Medicina Tropical "Pedro Kouri", Ave. 15 y calle 200, Siboney, Havana, Cuba. Growth studies of four species of freshwater prosobranch (Ampullaria glauca, A. paludosa, Marisa cornuarietis and Thiara tuberculata) were carried out under natural and laboratory conditions in Guadeloupe, Martinique and Cuba. The growth parameters (k and L_0), as well as the growth curves, revealed that they are all slow-growing snails with a great life span. Unlike the pulmonate intermediate hosts that are fast-growing species with a short life span, they can keep steady populations--an advantage for a biological control agent.

11:00 am BIO-9 Factors Regulating the Presence of Pomacea paludosa in Cuban Freshwater Habitats. G. PERERA AND M. YONG, Laboratorio de Malacología, Instituto de Medicina Tropical "Pedro Kouri", Ave. 15 y calle 200, Siboney, Havana, Cuba. A study of 25 cuban freshwater habitats distributed on Main Island as well as in the Isle of Youth was conducted. Abiotic factors influencing the presence of Pomacea paludosa (Say) were analyzed as were other ecological features. It was observed that the main factors regulating the presence of this snail were total hardness, chlorine concentration, salinity and temperature. On the contrary, pH does not seem to be a limiting factor, nor do the presence of floating aquatic vegetation and the kind of substratum.

11:15 am BIO-10 Life Tables of Pomacea paludosa (Say) in Natural Conditions. J. R. FERRER, G. PERERA, AND M. YONG, Laboratorio de Malacología, Instituto de Medicina Tropical "Pedro Kouri", Ave. 15 y calle 200, Siboney, Havana, Cuba. The life tables (growth, mortality and reproduction) of Pomacea paludosa (Say) were studied in its natural habitat using plastic boxes specially designed for this purpose. For 182 snails divided into 9 size classes and among 6 boxes, the growth parameters were $k = 0.092$ and $L_0 = 57.39$, showing that this is a slow-growing snail with a long life span. Mortality percentages were found to be higher between 15-20 mo of age, and the reproductive peak was observed at 6 mo. These facts point to a k-strategist snail when compared with pulmonates, which is an advantage for its use as a biological control agent.

11:30 am BIO-11 Seasonal Studies on Pomacea paludosa in Cuba. G. PERERA AND M. YONG, Laboratorio de Malacología, Instituto de Medicina Tropical "Pedro Kouri", Ave. 15 y calle 200, Siboney, Havana, Cuba. Studies carried out in a cuban lake that holds a dense population of Pomacea paludosa (Say) showed that this snail varies its abundance depending mainly on the availability of food. It is, however, also influenced by temperature and total hardness, among other abiotic factors that together exert some effect. Previous studies showed that the pH found in cuban lakes is not a limiting factor for its presence as it is for other snails. The reproductive peaks are found between November and January, with a high density of egg masses (84 m^{-2}) in emergent vegetation.

11:45 am QUAD 3

BUSINESS MEETING: BIOLOGICAL SCIENCES

J.A. Rodgers, Jr., Wildlife Research Laboratory, presiding

Friday 1:00 pm Teaching Pavilion

ANNUAL BUSINESS MEETING: FLORIDA ACADEMY OF SCIENCES

and Plenary Address I

"The Bass Biological Laboratory of Englewood, Florida: 1931-1944"

Friday 3:15 pm Teaching Pavilion

ACADEMY TUTORIAL: SURVEY OF NEURAL NETWORKS

By D.W. and L.V. Fausett, Florida Institute of Technology

Friday 10:15 am QUAD 3

SESSION B: Terrestrial and Freshwater Ecology

J.A. Rodgers, Jr., Wildlife Research Laboratory, presiding

10:15 am BIO-12 Detection Of Virulence-Associated Factors Produced By Bacteria Isolated From Fish Exhibiting Ulcerative Disease Syndrome (UDS). D. J. MCGAREY, D. TE STRAKE, AND D. V. LIM, Department of Biology and Institute for Biomolecular Science, University of South Florida, Tampa, Florida 33620. Ulcerative disease syndrome (UDS), an epizootic disease of fish in the lower St. Johns River, Florida, is characterized by severe, open dermal ulcers commonly occurring on the head, mandible, and midbody regions of marine and fresh-water fish. Aeromonas spp., Vibrio spp., Plesiomonas shigelloides, and Alteromonas putrefaciens were routinely recovered from the lesions and blood of fish exhibiting UDS. Investigations into the role that bacteria play in UDS suggest that these organisms are opportunistic or secondary pathogens. Production of hemolysins, proteinases, DNase, Staphylococcus aureus cell lysis, and development of lesions in challenged catfish were assayed. The aeromonads produced the highest activity of virulence-associated factors.

10:30 am BIO-13 Electronic Tracking Methods Being Incorporated into the Research Facilities of the Everglades Institute. P. EDWARD WEBB, D.O. AND BARBARA ROTHSTEIN, PH.D., Everglades Institute c/o 735 Tyler St., Hollywood, FL 33019. In order that researchers be able to gather the most data possible concerning the ever-threatened Everglades/ Big Cypress area wildlife, it is necessary to utilize sophisticated equipment within the limited budget of the researcher. These systems utilize both passive and active methods in the electromagnetic spectrum. A semi-portable dopler automatic direction-finder which may be used on surface or airborne research platforms and a wearable unit will be described. Animal mounted pulsed laser night tracking units will be discussed. Methods of radio relaying of information back to the computer in the lab will be elaborated.

10:45 am BIO-14 A New Method for the Quantification of Reproductive Rate of the Florida Tree Snail, Liguus fasciatus. J.M. JACOBSEN, The Everglades Institute, P.O. Box 653954, Miami, FL 33265. Due to the lack of suitable, manipulatable, and controllable natural habitats for study, artificial egg laying areas were placed around appropriate trees without Liguus populations. Snails were introduced on the subject trees. Successful laying of egg clutches was observed. Variables encountered in the test situation included food supply, humidity, predation, egg laying substrate and even wildfire. There is a marked shortage of natural areas suitable for Liguus research and this method makes possible the study of reproductive biology in any area with suitable trees and weather.

11:00 am BIO-15 The Need to Delineate the Ecological Role of the Exotic Clam Corbicula fluminea in Florida Freshwater Habitats. R.J. BROCK (1), T.L. CRISMAN (1), AND J.L. HULBERT (2), (1) Department of Environmental Engineering Sciences, University of Florida, Gainesville, FL 32611, (2) Florida Department of Environmental Regulation, Orlando, FL 32803. Corbicula fluminea was introduced into the U.S. from Asia during the 1930's and reached Florida in the early 1960's. Most research in the state has been concerned solely with documenting the species' spread. Our research suggests that Corbicula can reach densities of 100's-1000's / m² in

moderately eutrophic lakes and can have a pronounced impact on the structure and function of the plankton. Potential influence on macroinvertebrate communities, nutrient cycling, and fisheries also will be discussed.

11:15 am BIO-16 Bacterioplankton-Trophic State Relationships in Lake Okeechobee. J.H. KIEFER (1), V. NILAKANTAN (1), J.R. BEAVER (1), T.L. CRISMAN (1), AND P.V. ZIMBA (2), (1) University of Florida, Department of Environmental Engineering Sciences, Gainesville 32611, (2) Department of Fisheries and Aquaculture. Approximately 600 epifluorescence determinations of bacterioplankton abundance in Lake Okeechobee were made between August 1988 and August 1989 from littoral and pelagic habitats. Bacteria populations reached maximum concentrations during summer months regardless of dominant vegetation. Mean bacterial abundance for the lake was ca. one million cells/ml and was consistent with other Florida lakes of similar trophy. Temporal relationships between trophic state parameters and bacteria populations will be discussed. Funding provided by the South Florida Water Management District.

11:30 am BIO-17 Influence of Food Supplies on Florida Scrub Jay Breeding Phenology. R. L. CURRY (1), J. W. FITZPATRICK (1), AND G. E. WOOLFENDEN (1,2), (1) Archbold Biological Station, Lake Placid 33852, (2) Department of Biology, University of South Florida, Tampa 33620. As part of an ongoing study of scrub jay social ecology, we have measured jay food supplies continuously since 1987. In oak scrub habitats most used by foraging jays, orthoptera are most abundant from April through September, caterpillars in April and in late summer/early autumn. Spider numbers exhibit less seasonal variation. Availability of treefrogs and anoles is highest in autumn. Jays eat or cache fresh acorns from August through December, and feed on stored acorns through March. Scrub Jays begin producing eggs in March, just prior to the spring flush of arthropods, and cease nesting in June while food remains abundant. Nest predation increases steadily during the breeding season, and adults suffer highest mortality in June through September. Food availability therefore appears ultimately to trigger the onset of scrub jay breeding but other variables, especially the risk of predation, influence its termination.

11:45 am QUAD 3

BUSINESS MEETING: BIOLOGICAL SCIENCES

J.A. Rodgers, Jr., Wildlife Research Laboratory, presiding

Friday 1:00 pm Teaching Pavilion

ANNUAL BUSINESS MEETING: FLORIDA ACADEMY OF SCIENCES

and Plenary Address I

"The Bass Biological Laboratory of Englewood, Florida: 1931-1944"

Friday 3:15 pm Teaching Pavilion

ACADEMY TUTORIAL: SURVEY OF NEURAL NETWORKS

By D.W. and L.V. Fausett, Florida Institute of Technology

Friday 3:30 pm QUAD 4

SESSION C: Physiology

T.W. Snell, University of Tampa, presiding

3:30 pm B10-18 Lectins block mate recognition in the rotifer *Brachionus plicatilis*. G. A. CECCHINE III AND T. W. SNELL, Division of Science, University of Tampa, Tampa 33606. Mate recognition in the rotifer *Brachionus plicatilis* is based on male detection of a body surface glycoprotein on females. Males were exposed in mating bioassays to females treated with the lectins Concanavalin A, *Lens culinaris*, and *Pisum sativum*. The probability of male copulation with lectin treated females was 15% as compared to 60% for controls. These lectins also were shown to block fluorescent labeling with ConA-FITC of the mate recognition glycoprotein (MRG) on females as determined by fluorescence microscopy. *In situ* degradation of the MRG was investigated using the enzyme N-Glycanase, which releases asparagine-linked oligosaccharides from glycoproteins. Control females elicited male mating responses in 54% of encounters as compared to 12-18% for females exposed to N-Glycanase for 5-10 minutes.

B10-19 Electrophoretic Analysis of Glycoproteins Involved in Mate Recognition in the Rotifer *Brachionus plicatilis*. P. D. MORRIS AND T. W. SNELL, Division of Science, Univ. of Tampa, Tampa 33606. Mate recognition in the rotifer *Brachionus plicatilis* is mediated by cell surface glycoproteins. The chelators EDTA and EGTA remove female surface glycoproteins necessary for male mate recognition. Electrophoretic analysis of glycoproteins on SDS gels followed by silver staining revealed eleven protein bands, with a major band of 12,730 daltons. Eluents were treated with N-Glycanase, an enzyme which specifically cleaves asparagine-linked oligosaccharides from glycoproteins. A shift in the migration pattern was recorded for at least one glycoprotein as compared to untreated EDTA eluents. EDTA extracted, electrophoretically separated proteins were stained with ConA-FITC and observed at 450nm. These findings provide insight into the glycoproteins involved in rotifer mate recognition and their molecular structure.

4:00 pm B10-20 Acute Toxicity Bioassays Using Rotifers: Effects of cyst age, temperature and salinity on the sensitivity of *Brachionus calyciflorus*. B.D. MOFFAT AND T.W. SNELL, Division of Science, University of Tampa, Tampa 33606. Several factors modifying the sensitivity of the freshwater rotifer *Brachionus calyciflorus* (BC) to toxicants was investigated. LC50s for 28 compounds are reported and sensitivities compared to other animals. Using a standard protocol, toxicity bioassays were successfully completed in 98.8 % of 84 trials. Storage of cysts for up to 18 months had no effect on neonate sensitivity to sodium pentachlorophenate (PCP). Both high and low temperatures altered BC sensitivity to copper and PCP. BC cysts hatched in salinities up to 6 ppt with no alteration in PCP sensitivity. Regression analysis of BC LC50s and those of *Daphnia magna*, *Pimephales promelas* and *Brachionus plicatilis* showed that BC LC50s could predict the LC50s of these species.

4:15 pm B10-21 The Effect of Simulated Intracellular Cation Concentrations on the Specific Activities of Two Metabolic Enzymes from Tissues of the Asteroid, *Luidia clathrata* (Say). J.R. LEVERONE. Mote Marine Laboratory, 1600 City Island Park, Sarasota, Florida 34236. The effects of cation concentrations on the specific activities of pyruvate kinase (PK) and glucose-6-phosphate dehydrogenase (G-6-PDH) were examined in the pyloric caeca, gonads and tube feet of adult *Luidia clathrata*. Assay buffers, designated Low, Medium and High Salinity Cation Concentrations (LSCC, MSCC

and HSCC), were based on previously reported intracellular concentrations of Na^+ , K^+ , Ca^{2+} and Mg^{2+} from individuals that had been exposed to 15, 25 and 35 o/oo salinity, respectively, for one week. Specific activities were highest with LSCC buffers and lowest with HSCC buffers. This relationship held for both enzymes in all tissues. The differences among assay buffers for PK were small and mostly insignificant ($p \geq 0.05$), while G-6-PDH exhibited large and significant ($p < 0.05$) changes with assay buffer. These findings are discussed in light of the organism's intermediary metabolic needs under fluctuating environmental conditions.

4:30 pm BIO-22 Flavonoid Phytochemistry in Zygocactus Hybrid Cultivars. DONNA KAY MERK, Department of Biological Sciences, University of Central Florida, Orlando 32816. Clones of hybrid Christmas cactus show distinctive flavonoid profiles. Although a ground plan of shared flavonoids occurs among Zygocactus hybrids with similar ancestry, both quantitative and qualitative differences occur from one cultivar clone to the next. Cladophylls and pigmented perianths of each clone are analyzed separately for inter-varietal comparisons. Warm air (40 C) dried material is coarsely ground and extracted in methanolic solutions for 24-28 hours at room temperature. Initial separation of the flavonoids is by two dimensional paper chromatography followed by examination under UV and UV-ammonia fumes to characterize and mark flavonoid spots. Preliminary identification of compound classes is achieved by a combination of UV colors and RF values. Spot areas are then cut from 30-50 chromatograms and flavonoids extracted in methanol:water (1:1) for further purification using high performance liquid chromatography (HPLC). Pure compounds are then structurally elucidated utilizing UV, proton nuclear magnetic resonance (H-NMR), carbon-13 NMR, FT-IR and mass spectroscopy.

Friday 3:30 pm QUAD 3
SESSION D: Botany
S.D. Brack-Hanes, Eckerd College, presiding

3:30 pm BIO-23 Vegetation of Florida's Northeast Coastal Barrier Islands. R.B. HUCK, Division of Recreation and Parks, Department of Natural Resources, 2012 North Beach Street, Ormond Beach, FL 32174. A rich cultural history of many centuries of human occupation is evident in Florida's northeast coastal barrier island State Parks. The landscape is an ecological stage on which the panorama of human history has been played. Vegetation response is part of that history. Timucuan shell mounds, tabby remains from Loyalist plantations, slave quarters of the 19th century provide calciphilous substrate for phytogeographically significant ferns and the rare Ladies tresses orchid (Spiranthes polyantha). Second growth oak hammock with witness trees now cover the areas where large fields of cotton and sugar cane once were cultivated. Slash pine (Pinus elliottii) is often an invader in remnant interdunal swales.

3:45 pm BIO-24 Mangrove-Cattail Interaction: Invasion of Typha into a southwest Florida saltmarsh. DOUGLAS MORRISON AND JEFF MALSI. Environmental Resources Div., City of Cape Coral, POB 150027, Cape Coral, FL 33915. The mainland wetlands of Matlacha Pass State Aquatic Preserve are composed primarily of mangroves with scattered stands of saltmarsh grasses. However, Typha is invading these wetlands along sections of channelized low salinity (<7 ppt) discharge from a canal system. Shoot and leaf density and shoot height are being measured quarterly in random and permanent quadrats at the interface of the invading Typha and resident Rhizophora and Spartina. In 1989, above ground abundance decreased considerably during the dry season (January-June). However, Typha abundance rapidly increased during the wet season (June-October), re-establishing itself and spreading

farther into the saltmarsh vegetation. Typha seasonality was closely correlated with seasonality of surface water and soil salinity. Rhizophora exhibited little seasonality. The 3-4 months of low Typha abundance are apparently insufficient time for a substantial increase in abundance of the slower growing Rhizophora.

4:00 pm B10-25 Ecological Factors Associated with Pond-Cypress (Taxodium ascendens) and Bald-Cypress (L. distichum). S. T. BACCHUS, Department of Biological Sciences, University of Central Florida, Orlando 32816. Some plant taxonomists recognize two species of cypress (i.e., Taxodium ascendens Brongn. and L. distichum(L.) L.C. Rich.) in Florida, based on structural differences in branchlet and leaf morphology, bark, knees, and the bases of trunks. Comparisons were made between typical pond-cypress and bald-cypress stands in North, Central and South Florida. Multifaceted ecological analyses were conducted at the St. Marks National Wildlife Refuge in Wakulla County; Tosohatchee State Preserve in Orange County; and Jonathan Dickinson State Park in Martin County. Edaphic and hydrologic characteristics appear to correlate with species presence. Relevance of the findings is weighed with respect to the need to distinguish between the two taxa in the design and implementation of wetlands creation and restoration projects.

4:15 pm B10-26 The Effects of Fringe Mangrove Trimming for View in the South West Florida Aquatic Preserves. J. W. BEEVER III, South West Florida Aquatic Preserves, P. O. Box 591, Bokeelia 33922. Utilizing standardized methods of measurement of mangrove productivity and leaf parameters, three replicate quadrant columns were measured in comparison of cut and adjacent natural mangrove fringes in seven South West Florida Aquatic Preserves. On average for 1989 statistically significant reduction in net leaf export (81.2%) and reduction in new fruit production (89 %) results from the cutting of the 15.6 linear foot (mean) fringing red mangrove to 5.5 linear feet (mean). For the parameters measured no net positive benefit of mangrove trimming could be confirmed. The documented evidence of this study, prior study and existing literature indicate mangrove cutting is deleterious to the estuarine environment, the mangrove trees themselves and the fauna which depend upon mangroves for habitat and primary production.

4:30 pm B10-27 Fire Impacts on Cryptogams in Scrub and Pond Pine Communities. H. A. MILLER, Dept. Biological Sciences, Univ. Central Florida, Orlando 32816. Several Florida governmental agencies, including the Department of Natural Resources, Park Service, Game and Freshwater Fish Commission, and Department of Forestry, have aggressive fire management programs. The role of fire, or other disruption of ecological successions to create and maintain pinelands is widely recognized throughout the southeast. The Tall Timbers Research Station has actively promoted frequent burning as a management tool to sustain game bird populations and pine-grassland habitat. Lightning fires resulting in burns sustaining pinelands have been occurring in Florida for over 5000 years as shown from pollen data. Some Florida plant species occur only as successional taxa following disturbance, but others are severely impacted and reestablish very slowly following fire. The establishment of frequent burning schedules by the agencies without data on pre- and post-fire vegetation has raised concern among Florida scientists because of the loss of biological diversity over large areas. Our data reflect that ecologically sensitive cryptogamic vegetation remains impacted for at least the 18 year span covered in our studies.

Saturday 8:15 am QUAD 17
SESSION E: Marine Biology
G.W. Patton, Mote Marine Laboratory, presiding

8:15 am BIO-28 Marine Bacteria Associated With Growth Phases of Red Tide Cultures. P.A. HASBROUCK, J.D. BUCK, K. DEBORJAH AND R.H. PIERCE. Mote Marine Laboratory, 1600 City Island, Sarasota, Florida 34236. Cultures of the red tide organism, Gymnodinium breve, even though prepared from sterile media, are found to contain various species of bacteria. Although axenic cultures are desirable for investigations, previous studies suggest that G. breve cultures require associated bacteria for long-term survival (months). This investigation was undertaken to assess the bacteria associated with different growth phases of red tide cultures at MML. Approximately 100 bacteria have been isolated, with the dominant genera Alteromonas, Alteromonas/Pseudomonas, Flavobacterium/Cytophaga, and Moraxella. Population studies between the two have generated data that do not contradict the notion of interdependancies. However, further experimentation is required. These results are to be compared with studies of marine bacteria associated with red tide blooms, attempting to obtain a better understanding of the potential role of marine bacteria in red tide growth and possible synergistic effects of bacteria and bacterial toxins with red tides.

8:30 am BIO-29 Recent Changes in the Distribution of Caulerpa prolifera in the Indian River Lagoon, Florida. CONRAD WHITE AND JOEL W. SNODGRASS, Brevard County Office of Natural Resources Management, 2575 North Courtenay Parkway, Merritt Island, 32952. The changes in the distribution of the macroalga Caulerpa prolifera were determined between 1986 and 1989 in the northern portion of the Indian River lagoon, Florida. Aerial photography coupled with groundtruthing was used to map the alga's distribution. Possible reason for the observed changes in distribution are discussed.

8:45 am BIO-30 Recent Improvements of Water Quality and Biological Indicators in Hillsborough Bay, Florida. J.O.R. JOHANSSON, City of Tampa, Bay Study Group, 2700 Maritime Blvd., Tampa 33605. Hillsborough Bay is surrounded by a large metropolitan complex, supports extensive industrial activity, and serves as a major shipping port of fertilizer products. The bay was determined highly eutrophic during the late 1960's. The City of Tampa's primary sewage treatment plant and runoff from fertilizer industry activities were considered as the major sources of excessive nutrient loading. Loadings from both these sources have been reduced during the last 10 years, which probably has been the leading cause of improved water quality parameters such as water clarity, dissolved oxygen, and chlorophyll. The improvements recorded in these parameters may in part be related to large biomass reductions of a planktonic blue-green alga, which used to dominate the fall and early winter phytoplankton population. Coincidental with improved water quality, seagrasses and an attached macro-alga have vegetated shallow areas around the bay, which had been barren of attached vegetation for several decades.

9:00 am BIO-31 Long-Term Trends of Phytoplankton Taxonomic Composition in Hillsborough and Middle Tampa Bay, Florida: A Preliminary Report. A.P. SQUIRES, City of Tampa, Bay Study Group, 2700 Maritime Blvd., Tampa 33605. Phytoplankton samples have been collected monthly since 1978 from three stations as part of a monitoring project of Hillsborough Bay water quality. Seasonal and geographical trends have been assessed for concentrations of total phytoplankton, diatoms, phytoflagellates, blue-greens, and selected genera and species. Total Hillsborough Bay phytoplankton numbers have averaged 39,000/ml, ranging from 2000/ml to 100,000/ml. Seasonal trends for total numbers are characterized by low winter concentrations and multiple peaks during the warmer months. Diatoms, the most abundant group, include species of Skeletonema, Thalassiosira, Chaetoceros,

Leptocylindricus, *Nitzschia*, *Minutocellus*, and *Rhizosolenia*. Blue-greens have been restricted to annual occurrences of *Schizothrix calcicola sensu* Drouet from August to December, and have shown a marked reduction in peak concentrations after 1984. Future data manipulations of these data with other parameters will be discussed.

9:15 am BIO-32 The Status of *Halodule wrightii* in Hillsborough Bay, Florida. W.M. AVERY, City of Tampa, Bay Study Group, 2700 Maritime Blvd., Tampa 33605. In a 1986 survey of Hillsborough Bay, the City of Tampa, Bay Study Group (BSG) located 137 patches of *Halodule wrightii* with a total coverage of 0.2ha. Eight study sites representing various sediment types and geographic locations were selected and are visited in spring, summer and fall. In a subsequent survey in 1989, 395 patches of *H. wrightii* were located and areal coverage had increased to 0.5ha. The BSG transplanted about 10.5m² of *H. wrightii* to Hillsborough Bay in 1987. One area was planted using bare root units and seven areas were planted with sod units using 2.5m² and 8m² of source material respectively. In three years the bare root planting had increased to nearly 225m² and the total sod unit planting to approximately 200m².

9:30 am BIO-33 The Seasonality and Abundance of Ascidians, and Their Possible Relationship to Water Quality, in Hillsborough Bay, Florida. E.V. PINSON, City of Tampa, Bay Study Group, 2700 Maritime Blvd., Tampa 33605. Three stations, covering sediment types from mud to sand, have been sampled monthly since 1987 using a Standard Ekman dredge. Temperature, salinity, Secchi disk depths and dissolved oxygen have been measured coincident with sediment sample collections. Also, surface and bottom chlorophyll-*a* water column measurements have been taken since January 1989. Ascidian concentrations have exceeded 4000/m² and lengths have ranged from 0.25mm to 20mm for larvae and adults, respectively. High ascidian concentrations appear to occur when water clarity is greatest, and water clarity may be, in part, linked to the filter feeding activities of these organisms. The seasonality and abundance of ascidians will be discussed as they are related to selected water quality parameters.

9:45 am BREAK

BREAK POSTER: Radiography of the pelvic limb of the harbor seal, *Phoca vitulina*, to document skeletal development and as a possible aging technique. G. CONLOGUE, Gulf Coast Community College, Panama City 32401.

10:00 am BIO-34 Seagrass seasonality and population dynamics in the Charlotte Harbor estuarine system. D.E. MORRISON, P. RENAULT, P. LIGHT, AND C. MARX. Environmental Resources Division, City of Cape Coral, P.O. Box 150027, Cape Coral, FL 33915. Physiochemical conditions (salinity, temperature, irradiance) are often less than optimal for tropical seagrasses in the Charlotte Harbor area. The population dynamics of *Thalassia* and *Halodule* were studied at several locations, differing in salinity, in Matlacha Pass and Pine Island Sound. Shoot density, blade density, blade length, and biomass were sampled in December 1988, March, June, and October 1989. *Thalassia* and *Halodule* varied seasonally in abundance. Abundance was greatest in June, at the end of the period of optimal salinity. Under favorable growth conditions, *Thalassia* channelled most of its energy first into new shoot formation and then into blade growth. Seasonality was more pronounced at locations with lower salinity and greater annual salinity range. Salinity appears to be the abiotic factor most responsible for seagrass seasonality in the Charlotte Harbor region.

10:15 am BIO-35 Life History of a new species of Acanthoastorius (Amphipoda: Haustoriidae) from Tampa Bay, Florida. M.A. MORGAN, Mote Marine Laboratory, 1600 City Island Park, Sarasota, Florida 34236. A new species of Acanthoastorius from the Lassing Park area is described. This haustoriid amphipod differs consistently from previously described North American species by the presence of a large and strongly curved interramal spine on uropod 1. Preliminary data of sieved size classes taken in the course of a study of revegetation success in Lassing Park suggest that Acanthoastorius n. sp. has a biannual life cycle consisting of one cohort born during the spring that grows to sexual maturity by late fall and reproduces in November and December. This second cohort grows over winter until spring when they reproduce, and the cycle is repeated. Adults appear to die after breeding. Specimens of Acanthoastorius n. sp. will be measured more precisely, length-frequency diagrams generated, and other aspects of the population's sexual biology will be determined in order to fine-tune the life history of Acanthoastorius n. sp.

10:30 am BIO-36 Skull Morphometrics from Tursiops truncatus Stranded Along Florida's Central West Coast: 1984-1989. G.W. PATTON, H.F. ANDERSON, R.E. DELYNN, I.L. BROOKS AND J.C. ORZACH. Mote Marine Laboratory, 1600 City Island Park, Sarasota, FL 34236. Skull and body morphometrics are commonly used to distinguish the different species of marine mammals as well as population groups within a species. Seventy-six stranded Tursiops truncatus were examined under a federal Letter of Authorization over the period fall 1984 through fall 1989. Of these 76 specimens, fifty-four provided the skulls used in this report. Age was determined from growth layers in the teeth (n=58). Forty of the 54 skulls are of known sex. Twenty-nine skull morphometrics and the four meristics of tooth count/quadrant were analyzed. Tooth count averaged slightly higher for males. The percentage of skull length to body length averaged greater for males. Ranges in the percentage of skull characteristics to skull length are reported. Recommended changes are suggested to simplify and improve measurement techniques by local stranding programs.

10:45 am BIO-37 Preliminary Assessment of a Marine Turtle Population Inhabiting the Sabellariid Reefs off of Indian River County, Florida, with Comparisons to a Nearby Lagoon Population. J. L. GUSEMAN AND L. M. EHRHART, Dept. of Biological Sciences, Univ. of Central FL., P. O. Box 25000, Orlando, FL 32816. A system of nearshore Sabellariid worm reefs and the algae they support off of Indian River County provide a unique habitat for marine turtles. Using a nylon mesh tangle net, 18 juvenile green turtles, one subadult loggerhead, and one juvenile hawksbill have been captured during the summer and fall of 1989. Mean carapace length (35.6 cm) of the reef green turtles is significantly smaller than the mean (44.3 cm) of a population of juvenile green turtles inhabiting the Indian River Lagoon in north Indian River County, suggesting that the reefs may be an intermediate habitat before these post-pelagic juveniles enter the lagoon system through nearby inlets. Measurements of carcasses collected from adjacent beaches exhibit similar results (35.5 cm) and provide information on sex ratio.

11:00 am BIO-38 A Preliminary Report on the Causes and Locations of Manatee Mortality in Brevard and Indian River Counties, 1988-1989. P. J. THOMPSON, University of Central Florida, P. O. Box 25000, Orlando 32816. Manatee mortality has been documented in Brevard and Indian River Counties over the past two years. In 1988, 15% of statewide mortalities occurred in the Brevard-Indian River area. Through October 1989, this area accounted for 25.7% of all manatee deaths. Of the total mortalities in 1988, 35% occurred in the Banana River lagoon system. This figure increased to 48.6% in the first 10 months of 1989. The Indian River lagoon was the site of 45% of deaths in 1988 and 20% in 1989 (through Oct.). Boat/barge collisions accounted for 30% of the deaths in 1988 and 25.7% in 1989. An additional 0% (1988) and 8.6% (1989) were attributed to other human related causes. Perinatal mortalities (animals <150 cm) were 30% of the total in 1988 and rose to 37.1% through October, 1989.

11:15 am BIO-39 Comparison of Fishes Occurring in Monotypic Stands of Algae and Seagrass. JEOL W. SNODGRASS, Brevard Co. Off. of Nat. Res. Manag., 2575 N. Courtenay Pkwy., Merritt Island 32952. In the past fishes occurring over seagrass beds have been compared with fishes occurring over other types of habitats. comparisons have not been made with fishes occurring over algae beds. The distribution of the alga Caulerpa prolifera in the northern portion of the Indian River lagoon facilitated a comparison of this type. Fishes were collected using seines at two location in the lagoon. Collections took place on a monthly basis from October of 1986 to September of 1987. Qualitative and quantitative dominance of the two communities is compared and discussed. Mean number of fishes, juveniles, species, and Shannon Diversity per seine tow are compared using paired t-test. Multiple regression is used to investigate the relationship of physical and biological variable and number and biomass of fishes per seine tow.

11:30 am BIO-40 Systematic status of Atheriniform fishes in the Florida Keys. C.F. DUGGINS (1), K. RELYEA (2) AND A.A. KARLIN (3). [1, Univ. South Carolina, Columbia 29208; 2, Univ. of Montevallo, Alabama 35115; 3, Univ. Arkansas, Little Rock 77204]. Certain species of silversides and killifishes in the Florida Keys have generally been acknowledged to be distinct from peninsular Florida populations, with some (the Key Silverside Menidia conchorum and the Cuban Killifish Fundulus grandis saquanus) accorded distinct taxonomic status. However, morphological differences are slight and may represent differences typical of southern ends of clines. Our isozyme variation analyses do not support separate taxa for Keys populations of the Athernid M. conchorum (probably synonymous with M. perinsulae) and the Cyprinodontids F. grandis saquanus, F. similis, Lucania parva, Floridichthys carpio, and Cyprinodon variegatus. This conclusion does not negate conclusions which may be drawn from morphological studies, but such studies must weigh results against the seeming ecophenotypic plasticity of Atheriniform fishes. Species noted above and other Keys silversides and killifishes are threatened by development and human activity. Preservation of their habitat and additional knowledge of their biology are needed.

COMPUTER SCIENCES AND MATHEMATICS

Saturday 8:30 am QUAD 16

SESSION A: Computer Science

R. Newman, Florida Institute of Technology, presiding

8:30 am CSM-1 Water-Budget Analysis, Volusia-Floridan Sole-Source Aquifer. R. P. HAVILAND, MiniLab Instruments, 1035 Green Acres Circle North, Daytona Beach, FL 32119. The Volusia-Floridan Sole-Source Aquifer is an EPA designated sub-part of the Floridan aquifer which underlies most of the State. This "fresh water bubble" is surrounded by saline or low quality water, and is recharged solely by rain, primarily that falling on a small area, the DeLand Ridge. Aquifer levels have been falling since 1955, and there are now permanent water restrictions. This study reports the concept and details of a small-computer water budget analysis program family, which include terms for rainfall, evaporation, surface runoff, three aquifer layers, springs, pumpage and drainage. Preliminary results are reported. The major conclusions are that a combination of drainage and use are responsible for the potentiometric changes. Future work is outlined.

8:45 am CSM-2 Real-Time Executives : Observations and Considerations. CHARLES B. ENGLE, JR., Florida Institute of Technology, Dept. of Computer Science, 150 West University Boulevard, Melbourne 32901. Most real-time systems in use today are controlled by unique, hand crafted executives which assign processes to processors in some deterministic manner. When systems are relatively small, this simple technique is sufficient; but it does not scale up. Consequently, many large executives were actually "designed" by creating the system and adjusting it during debugging in an incremental test, *ad hoc* fashion. This technique produces unreliable software which is difficult to maintain and subject to erroneous operation in the presence of transient overloads. The basis for a real-time executive is discussed and a paradigm is proposed which lays a foundation upon which to construct future executives. Scheduling using the rate monotonic scheduling theory and the priority ceiling protocol is discussed.

9:00 am CSM-3 A First Look at Bayesian Networks and Neural Networks, DAVID M. IODICE (1) and FREDERICK B. BUONI (2), (1) Harris Corporation, Melbourne, FL, (2) Operations Research Program, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. Bayesian networks have been proposed as a method for representing uncertainty in classification expert systems. Similarly, neural networks have also been proposed as a method for classifying patterns. This paper will discuss common elements and differences between the two methods.

9:15 am CSM-4 Performance Issues for an Expert System Written in Ada. RHODA BAGGS, J. RICHARD NEWMAN and FREDERICK B. BUONI, Computer Science Department, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. We report on measurements made on the operational performance of AFES, the Ada Fuzzy Expert System.

9:30 am CSM-5 Introducing "QUALITY" into an Undergraduate Computer Science Curriculum, J. RICHARD NEWMAN, FREDERICK B. BUONI and JOHN HADJILOGIOU, Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901. We discuss methods for integrating software quality and operational quality issues into the first courses of an undergraduate computer science curriculum using principles of software engineering, mathematical abstraction, and Deming's statistical process control and total quality management.

9:45 am CSM-6 Parallelization of the Monte Carlo Method. G. W. HOWELL (1), AND P. A. KAIRIS (1), (1) Department of Applied Mathematics, Florida Institute of Technology, 150 West University Blvd., Melbourne 32901. The potential of intrinsic parallelism in Monte Carlo methods can be exploited to implement such a method on parallel computers. We compare an optimized serial implementation with implementations on several parallel machines. Vectorization is also discussed. The codes implemented are designed to apply to convection-diffusion problems. Possible applications include a method of separating isotopes.

10:00 am CSM-7 A Frame Representation for Knowledge on the Coastal Environment of Florida. Leah Simpson, Robert Wawoe, AND Dan Tamir, Computer Science Department, Florida Institute of Technology, Melbourne Florida 32937. In this paper we present a knowledge representation management system. The knowledge representation schema is a modified frame structure. Traditionally a frame contains only declarative knowledge. In our system, a frame contains additionally a decision block (i.e., procedural knowledge). The system is implemented using the LISP programming language. A frame is a dynamic data structure. The basic management operations include insertion, removal, and modification of a frame. The domain is the coastal environment of Florida. The system is in compliance with the model for that domain developed by the Marine Resources Council at Florida Institute of Technology. Florida's coastal environment seems to be an attractive domain for interactive expert systems for several reasons, such as complex interrelationships among its species and the physical environment, the serious nature of its current problems and the availability of a wealth of data. Moreover, it seems that automatic knowledge representation and decision support systems in this domain have not yet been explored. We intend to expand the structure and add inference engine and decision support operations to the system, using the decision blocks.

10:15 am CSM-8 *Parallel Cooperative Fuzzy Expert Systems for Pattern Recognition.* MOR-DECHAY SCHNEIDER Department of Computer Science, Florida Institute of Technology, Melbourne FL, 32901-6988. There are several problems associated with pattern recognition. First, the object in the digitized picture may be distorted by noise, partially missing or vague. Second, most applications require large digitized images. To recognize patterns under these conditions requires processes which are time consuming and not applicable in real time. The intent of the proposed research grant is to develop and implement new techniques in the area of pattern recognition. The proposed system will utilize Artificial Intelligence procedures and parallelism to reduce the time required to recognize an object and to increase the certainty that the recognized object was the object intended to be recognized. In particular, we will concentrate on developing procedures to decide when to invoke parallelism, how to utilize procedures to match imperfect images, how to define relations among features of an image and how to evaluate the certainty of the recognized image.

Saturday 10:45 am QUAD 16

SESSION B: Mathematics

D. Schrader, St. Petersburg Junior College, presiding

10:45 am CSM-9 Development of Some Modified Maximum Likelihood Estimators of the Weibull Process. CHRIS P. TSOKOS and A. N. V. RAO, University of South Florida, Tampa, Florida 33620. A non-homogeneous Poisson process with Weibull intensity function is often used to analyze the failure patterns of repairable systems. Simple distributional results for the maximum likelihood estimators of the parameters are available. In the present study the effect of using such point estimators in performing reliability analysis such as the failure intensity is investigated. An exact unbiased estimator of the failure intensity at the time of the n th failure and a comparison with some approximate results will be given.

11:00 am CSM-10 Statistical Modeling and Analysis of a Passive Smoking Study. CHRIS P. TSOKOS, University of South Florida, Tampa, Florida 33620. The aim of the present study is to present a comprehensive statistical analysis of the data of an epidemiological study on passive smoking conducted by S. Matsukura, T. Taminato, N. Kitano, Y. Seing, H. Hamada, M. Vchihashi, H. Nakajima, and Y. Hirata, *The New England Journal of Medicine*, Sept. 27, 1984, pp. 828-832. The experiment and development of the data base involved 864 persons in Western Japan. The primary objective of the epidemiological investigation is to determine the effects of passive smoking at home, the workplace, the community and urban environment.

11:15 am CSM-11 Empirical Bayes Approaches to Estimation. PAUL DesROCHE and CHRIS P. TSOKOS, University of South Florida, Tampa, Florida 33620. The object of the present study is to investigate the different approaches for establishing Empirical Bayes estimators of population parameters and functional forms thereof. In particular two main classes of Empirical Bayes estimators will be discussed and compared. They include those which implicitly estimate the prior distribution versus those which explicitly estimate the prior distribution. In addition, modifications of the theory which include Nonparametric Empirical Bayes and Bayes Empirical Bayes will be discussed. Finally, a new procedure for obtaining Empirical Bayes estimators will be introduced.

11:30 am CSM-12 On the Theory and Applications of the Logistic Distribution. PETER S. DiCROCE and CHRIS P. TSOKOS, University of South Florida, Tampa, Florida 33620. The present study investigates the different mathematical foundations of the logistic model. It identifies and classifies the most desirable estimation procedures with respect to the parameter configuration in the underlying model. The usefulness of these models will be identified relative to their application to epidemiology, bio-assay, medical diagnosis and economics among others.

11:45 am CSM-13 Weibull Model for the Prediction of Software Reliability Using Bayes Empirical Bayes Approach. N. SURESH and A. N. V. RAO, University of South Florida, Tampa, Florida 33620. This paper investigates the Weibull Model for describing the behavior of software failures in a bayes empirical bayes set up. In practice, as failures occur, the causes for the failures are identified, corrected and failure modality is changed. Therefore, a Weibull model which takes into account the aging effect seems to be more appropriate. Analysis is based upon the time between failures during testing stage of software development process. This model fits into the time domain approach to modeling of software reliability. We apply the model to some actual failure data and compare the predictive performance with the exponential model in the same set up developed by T. A. Mazzuchi and R. Soyer.

Saturday 12:00 noon QUAD 16

BUSINESS MEETING: COMPUTER SCIENCES AND MATHEMATICS
D. Schrader, St. Petersburg Junior College, presiding

ENGINEERING

A Special Program "EXPANDING YOUR HORIZONS IN ENGINEERING, SCIENCE AND MATHEMATICS"

The Florida Academy of Sciences (Engineering Section), Society of Women Engineers (Spacecoast Section) and Florida Institute of Technology are sponsoring a special program in 1990 to:

- increase young women's interest in mathematics and science,
- foster awareness of career opportunities for women, and,
- provide students an opportunity to meet and form personal contacts with women in nontraditional occupations.

Nationally, the program has attracted more than 20,000 students and 4,500 parents and educators to 80 conferences involving a total of 3,000 women professionals who participated as role models. This year, the program will target eighth to eleventh grade women in Brevard County and surrounding schools.

The conference, subtitled "Puzzle pieces: putting it all together for the 21st Century", begins at 8:30 am, Saturday, March 24, with a keynote address by Dr. Leslie Sue Lieberman (Department of Anthropology, University of Florida). In 1987, Dr. Lieberman became the first woman to hold the office of President in the Florida Academy of Sciences.

The conference includes small-group workshops of students meeting with women role models from a number of technical fields represented in the three sponsoring organizations. Persons interested in participating in or observing the conference should contact Betty Preece at (407) 723-4151 or (407) 723-6835, or by using the message board located near the registration desk, at the Academy meeting.



ENVIRONMENTAL CHEMISTRY

Saturday 8:45 am QUAD 20

SESSION A

D. Black, South Florida Water Management District, presiding

8:45 am ENV-1 Leaching Characteristics of the Stabilized Municipal Solid Waste Incineration Ash in Seawater. YUNG-LIUNG WEI, AND CHIH-SHIN SHIEH, Dept. Chem. and Envir. Eng., Florida Institute of Technology, Melbourne 32901. Studies were carried out to determine the leaching of heavy metals from the stabilized municipal solid waste (MSW) incineration ash in seawater. The purpose of this study was to provide useful information in assessing the applicability of using the stabilized MSW incineration ash for the construction of artificial reefs in the ocean. Both the loose and the stabilized MSW incineration ashes were examined for the leaching characteristics in seawater. The results of the study indicated that leaching of heavy metals from the MSW incineration ash was significantly minimized by the stabilization process. Beneficial uses of the stabilized MSW incineration ash should be considered and evaluated.

9:00 am ENV-2 Platinum Recovery from Catalytic Converters for Use in the Laboratory and as a Profitable Endeavor. TROY A. PIERCE AND DR. JEANNE S. ROBINSON, Seminole Community College, Sanford 32773. Current platinum recovery methods are evaluated after application. Cost compared to yield analysis and obvious benefits from recycling these "new native platinum reserves" will be discussed. Results of attempts at new methods will be presented as well as possibilities for further research.

9:15 am ENV-3 Elemental Carbon as a Component of Urban Atmospheric Total Suspended Particulate Matter. JOHN T. BUTCHER AND R. DEL DELUMYEA, Millar Wilson Laboratory for Chemical Research, Jacksonville University, Jacksonville 32211. Total particulate matter is indigenous to the environment but the concentrations of its components are influenced by local sources. The preliminary objective of this study is to determine the concentration of elemental carbon that exists as a component of the total suspended particulate material of Jacksonville, Florida. Samples of the ambient air in Jacksonville were collected every other day for a year. The elemental carbon content was determined through the correlation of reflectance and photoacoustic signals of the samples. These data were quantitatively substantiated by comparison to values of elemental carbon standards.

9:30 am ENV-4 Chemical Probe Analysis of Aquatic Environments. DONNA McCLEARY AND R. DEL DELUMYEA, Millar Wilson Laboratory for Chemical Research, Jacksonville University, Jacksonville 32211. In the past, in order to analyze sediments and the interfacial zone, it was necessary to take core samples, which were subject to numerous potential errors. An alternative method will be presented for analyzing sediments using chemical probes incorporated with colorimetric reagents. Their preparation, applications, deployment, analysis, and advantages over coring will be discussed.

9:45 am ENV-5 Structure of Nickel(II)-Schiff Base Compounds and Environmental Implications. CHUHUA WANG AND DEAN F. MARTIN, Institute for Environmental Studies, Department of Chemistry, University of South Florida, Tampa, Florida 33620. Structures of nickel complexes of the type $\text{Ni}[\text{RCOCHC}(\text{NHR}')\text{R}]_2$ are being investigated because of the potential that these substances have for serving as models for useful reactions, e.g. dehalogenation of trihalomethanes. Previously we demonstrated that complexes of this type could be partially resolved by chromatography over D-lactose [*Inorg. Chem.*, 2, 587-590 (1963)]. This is consistent with a non-planar structure, either tetrahedral or distorted tetrahedral. Currently, we report the magnetic susceptibilities and the spectra of these compounds to evaluate their structure.

10:00 am BREAK

10:15 am ENV-6 The Toxic Spill Index (Emergency Response Spill). DEAN F. MARTIN, CHRISTINE M. FLYNN, CHARLES D. NORRIS, AND BARBARA B. MARTIN. Institute for Environmental Studies, Department of Chemistry, University of South Florida, Tampa, Florida 33620. An index has been devised to indicate the magnitude of a toxic spill. The index is a product calculation that varies from 0-96. It incorporates an estimate of the magnitude of the spill, the spill type (unknown, leak, spill), the medium affected, and the magnitude of the hazard represented. The method of calculation appears to be straightforward, based upon a survey of persons who performed trial calculations.

10:30 am ENV-7 Stationary Tank Index. CHARLES D. NORRIS, M. CHRISTINE FLYNN, AND DEAN F. MARTIN. Institute for Environmental Studies, Department of Chemistry, University of South Florida, Tampa, Florida 33620. The Stationary Tank Index was one of several indices developed in conjunction with the Strategic Assessment of Florida's Environment (SAFE) Project funded by the Department of Environmental Regulation. Surveys of the status of stationary storage tanks were performed by the Department of Environmental Regulation. An index summarizing important parameters affecting the environment such as number, type, and activity status was developed to yield a convenient scale for comparative study.

10:45 am ENV-8 Exotic Aquatic Plant Index. M. CHRISTINE FLYNN AND DEAN F. MARTIN. Institute for Environmental Studies, Department of Chemistry, University of South Florida, Tampa 33620. The Exotic Aquatic Plant Index was one of the indices developed as part of the Strategic Assessment of Florida's Environment (SAFE) Project funded by the Department of Environmental Regulation. Surveys of area of waterbodies covered by selected plants performed by the Florida Department of Natural Resources, Bureau of Aquatic Plant Regulation and Permitting, were developed into an index which describes the extent of coverage of hydrilla (Hydrilla verticillata Royle) and water hyacinths (Eichornia crassipes (Mart.) Solms). The Exotic Aquatic Plant Index is a per mille value of ratio of area covered by the plants to total area of waterbodies. The 1986 Plant Index value was 50.6 based on a scale of 0-100. Environmental implications are discussed.

11:00 am ENV-9 The Role of Iron in the Growth of Lyngbya majescula. ELSIE GROSS AND DEAN F. MARTIN, Institute for Environmental Studies, Department of Chemistry, University of South Florida, Tampa, Florida 33620. Lyngbya majescula is a filamentous, freshwater, blue-green alga which grows excessively in nutrient enriched Florida waters. The role of iron in the growth of Lyngbya majescula, with a view to determining nutrient function as well as possible inhibition characteristics has been studied. Analysis of iron in the presence of chelators has been observed through interaction of iron with 2,4,6-tripyridyl-s-triazine (TPTZ) forming an intensely colored violet complex. Results to date will be discussed.

11:15 am ENV-10 A New Technique for Field Assessment of Mosquito Larvicide Impact on Nontarget Organisms. L.S. PROFFITT, M.S. HENRY AND R.H. PIERCE. Mote Marine Laboratory, 1600 City Island, Sarasota, FL 32436. A new technique for monitoring the impact of the mosquito larvicide, temephos (Abate 4-E, American Cyanamid), to nontarget larvae, was tested during routine larviciding applications in cooperation with the Lee County Mosquito Control District. The larvae of 3 crab species indigenous to Florida saltmarsh communities (Uca rapax, aratus pisonii, Sesarma cinereum) were placed in monitoring wells in floating Plexiglass® trays along with larvae of the target mosquito, Aedes taeniorhynchus. The method requires collection and holding of gravid female crabs with recovery of larvae released during full and new moon tidal cycles. Within 4 hours after temephos application, mosquito larvae at all 3 test sites exhibited 100% mortality, whereas crab larvae exhibited an average of 35% mortality among the 3 species at all 3 sites. No mosquito larvae died at the control site, yet crab larvae exhibited >50% mortality, indicating the need for further tests to improve techniques for holding and observing crab larvae within the saltmarsh environment.

11:30 am ENV-11 Groundwater Influence on the Water Chemistry of the Suwannee River. DAVID W. BLACK, South Florida Water Management District, West Palm Beach 33416. Inflow of groundwater to the Suwannee River dramatically changes the water chemistry between the river's origin as a soft, acidic stream leaving the Okefenokee Swamp and its mouth at the Gulf of Mexico. Analysis of data collected by the Suwannee River Water Management District gives a detailed picture of the changes due to groundwater, some of which are significantly influenced by man. Predictions are made of further changes that would result from proposed human activities that would increase groundwater influence in the upper river.

Saturday 11:45 am QUAD 20

BUSINESS MEETING: ENVIRONMENTAL CHEMISTRY

D. Black, South Florida Water Management District, presiding

GEOLOGY AND HYDROLOGY

Preliminary Announcement for a 1991 Symposium, Florida Paleontology

The Geological and Hydrological Sciences Section of the Florida Academy of Sciences announces plans for a symposium on Florida Paleontology, to be held in conjunction with the Annual Meeting at Saint Leo College in May of 1991.

The Florida fossil record has attracted international attention for more than a century and Florida has produced a number of distinguished paleontologists. The tradition of excellence in this field will continue into the Twenty-First Century as Florida's fossil resources receive increased scrutiny and Florida faculty and students of paleontology grow in number and expertise.

Persons interested in helping to plan the symposium or seeking to participate are invited to contact Dr. Richard Strom, Department of Geology, University of South Florida, Tampa 33620, telephone (813) 974-2773.

MEDICAL SCIENCES

Saturday 9:30 am QUAD 22

SESSION A

A.C. Vickery, University of South Florida, presiding

9:30 am MED-1 The Incidence of Cryptosporidium Infection Associated with Diarrhea in West Central Florida, 1985-1988. L. R. F. BINFORD (1), M. A. PENTELLA (1), AND B. H. KWA (1), (1) College of Public Health, University of South Florida, 13301 Bruce B. Downs Blvd., Tampa 33612. A descriptive case-report study is made of data from medical hospitals and clinical laboratories in seven counties (Pinellas, Hillsborough, Polk, Pasco, Hardee, Manatee and Sarasota) of west central Florida to determine the incidence of Cryptosporidium infections associated with diarrhea in the region for the years 1985 through 1988. Two instruments for obtaining data, a questionnaire and case report form, are used in the survey. The rationale for undertaking this project, the problems encountered in studying this particular organism, and the results that have been obtained are discussed. Possible public health problems associated with Cryptosporidium infections in this subtropical area of Florida are also examined.

9:45 am MED-2 Incidence of Cryptosporidium in the Lakeland Region of Central Florida in 1989. M.A. PENTELLA, B.H. KWA, AND L.R.F. BINFORD. Lakeland Regional Medical Center, Lakeland, Fl. and Univ. of South Florida, College of Public Health, Tampa, Fl. Central Florida affords ideal conditions for Cryptosporidium propagation, that is, warm temperature, a summer rainy season, large areas of agricultural land, numerous cattle ranches, and dairy farms. The only Cryptosporidium observed in 1989 was a cluster of four cases in August. All patients were adults hospitalized with severe diarrhea. One patient was immunocompromised. Only one patient had traveled outside the area. Two patients resided in a rural environment, the other two resided in the Lakeland city limits. None of the patients were employed in agriculture. No other pathogens were detected. The clustering of these cases suggests that environmental factors such as temperature and rainfall affect the incidence of Cryptosporidium.

Combination Therapy in Leprosy--Drawbacks. A. M. Dhople, L. C. Strong and G. D. Gardner, Dept. of Biol. Sc., Fla. Inst. of Tech., Melbourne, FL 32901, Holmes Regional Med. Ctr., Melbourne, FL 32901

10:00 am MED-3 The current multidrug therapy in leprosy consists mainly of dapsone, rifampicin and clofazimine, along with other drugs, and this is done purely on hypothetical basis. In order to gain more insights into the efficacy of these combinations, both in vitro and in vivo studies were undertaken. In in vitro studies, no additive effects were seen when low level of dapsone was combined with either rifampicin or clofazimine. However, at levels below their individual M.I.C.s, antagonism was observed between dapsone and rifampicin. Similar antagonism was also observed between rifampicin and clofazimine. However, in in vivo studies, though antagonism was observed between rifampicin and dapsone, synergism was observed when rifampicin and clofazimine were combined.

10:15 am MED-4 Comparative Susceptibilities of Dasyus novemcinctus from Venezuela and Florida to infection with Mycobacterium leprae. SHARON WILLIAMS, ELEANOR E. STORRS, ARVIND M. DHOPLE, JACINTO CONVIT, AND JULIO CERDA, Florida Institute of Technology, 150 W. University Blvd., Melbourne, FL 32901-6988 and Inst. de Biomedicina, Caracas, Venezuela. Thirty-seven Venezuelan armadillos, in four shipments, between December 1980 and April 1986, have been introduced into the armadillo colonies at F.I.T. Attempts to use these animals in leprosy studies have met with mixed success. A total of sixteen armadillos from Venezuela have been inoculated with M. leprae. Of the eight animals that went to term, only four developed into fully disseminated leprosy. This is compared to a susceptibility rate of eighty to ninety percent in Florida armadillos.

10:30 am BREAK

10:45 am MED-5 Allergenic Cross-reactivity between the Pollens of Melaleuca leucadendron (melaleuca), Callistemon citrinis (bottlebrush), and Paspalum notatum (bahia). S. HOSSEINY*, S. HUNTER, R. GENNARO, S. KLOTZ, R. WHITE, and M. SWEENEY. University of Central Florida, Orlando, 32816. Immunochemical studies have demonstrated that a high degree of antigenic as well as allergenic cross reactivity exists between the components of three pollens: melaleuca (ME), bottlebrush (BO), and bahia (BA). SDS-PAGE analysis showed that extracts of ME, BO, and BA contain multiple components which react with all three rabbit antisera (anti-ME, anti-BO, and anti-BA). Many pollen components separated by SDS-PAGE and transblotted to nitrocellulose were reactive with allergic patient IgE and had molecular weights in the range of 29-66 KD. The high degree of cross reactivity between these pollens has also been observed in skin testing. Preliminary results obtained with 55 randomly selected patients demonstrated that 81% of patients skin test positive to at least one of the three pollens were also positive to the other two.

11:00 am MED-6 Identification Of Motile Aeromonads By Rapid Bacteriological And Serological Methods. D. J. MCGAREY, D. FOLEY, AND D. V. LIM. Department of Biology and Institute for Biomolecular Science, University of South Florida, Tampa, FL 33620. The motile aeromonads, Aeromonas hydrophila, A. sobria, A. caviae, and A. veronii, are aquatic bacteria that can cause wound infections, gastroenteritis, and septicemia in humans. This group is separated into thirteen different genetic species representing 6 phenotypes. The API 20E, API Rapid NFT, and Minitek Nonfermenter (NF) rapid identification systems were used to phenotypically identify Aeromonas isolates. The API 20E was able to identify 79.6% of the isolates tested to the correct genus whereas the API Rapid

IFT and Minitek NF identified 66.7% and 50% to the same level, respectively. The highest error occurred in the identification of A. caviae for all three systems which identified the isolates as Vibrio species. Antiserum raised against A. caviae ATCC 15467 identified 86% of A. caviae isolates tested by slide agglutination.

11:15 am MED-7 Studies of Protease and Lipase Activities of Pythium insidiosum DeCock, et al., Saprolegnia sp., Achlya sp., and Aphanomyces sp. SAIRA S. KHAN, LES BREWER, AND DIANE TE STRAKE, Department of Biology, University of South Florida, Tampa, Florida 33620. Pythium insidiosum from a horse, Aphanomyces sp. from Atlantic menhaden, Achlya sp. from a river, and Saprolegnia sp. from an estuary were all examined for protease and lipase activities. All four test isolates were capable of growth at various temperature levels, sodium chloride concentrations, and salinities. The river isolate, Achlya sp., produced proteolysis on casein agar and in gelatin tubes; while the estuarine isolate, Saprolegnia sp., produced gelatin liquefaction but did not hydrolyze casein. Both animal isolates hydrolyzed casein, but only Aphanomyces sp. produced gelatin liquefaction and hydrolysis of elastin. All four isolates produced some degree of lipolytic activity.

Saturday 11:30 am QUAD 22

BUSINESS MEETING: MEDICAL SCIENCES

A.C. Vickery, University of South Florida, presiding

PHYSICAL AND SPACE SCIENCES

Friday 3:15 pm QUAD 18

SESSION A

B. Vail, West Orange High School, presiding

3:15 pm PSS-1 Free Electron Screening. J.D. PATTERSON AND WAFAA

BDELHAKIEM, Florida Institute of Technology, Department of Physics and Space sciences, Melbourne, FL 32901. We review the linearized Thomas-Fermi and Debye-Huckel methods for treating the screening of a charged impurity by a free electron gas. We also derive the Lindhard expression for the dielectric function of a free electron gas and show that the small q limit reduces to the Thomas-Fermi result. As a pedagogical exercise, we work out the screening due to three other potentials besides the single charged impurity potential (commonly treated in texts) and we note that in every case the screened potential is less attractive (or repulsive) than the bare one is. The subject of screening is important in a variety of areas, perhaps most notably in properly calculating the scattering of charged carriers in polar solids with charged impurities.

3:30 pm PSS-2 Electron-Ion Interactions and Electromigration. J. D.

PATTERSON, AND SRINIVASAN IYENGAR, Florida Institute of Technology, Melbourne, FL 32901. Electromigration is the motion of ions in a conductor due to momentum exchange with flowing electrons and also to the Coulomb force from the electric field. The momentum exchange mechanism typically dominates. Electromigration, which is diffusion with a driving force, increases with electric current density and it is becoming an important failure mechanism in aluminum interconnects in integrated circuits. Electromigration damage can occur when there is a divergence in the flux of aluminum atoms. This can cause the appearance of void (and

hence a break in the circuit) or of a hillcock(which can result in a short circuit) We do simple one dimension calculations to illustrate how the "electron wind" force can contribute to the steady flow of atoms.

3:45 pm PSS-3 Dynamics of Low-Dimensional Systems. TOUFIC M. HAKIM, Jacksonville University, Jacksonville, 32211. Dynamics of inert gas solid monolayers are studied via the self-consistent phonon method. It is found that neon and argon monolayers display large quantum effects and their phonon lifetimes are very sensitive to variations in temperature. In inelastic neutron scattering simulations, the scattering intensities show significant thermal broadening which can be explained in terms of anharmonic interactions between the phonons in the monolayers.

4:00 pm PSS-4 Magnetic Field of a Conducting Loop by Brute Force. V. CONSTNAT and T. M. HAKIM, Jacksonville University, Jacksonville, 32211. The magnetic field due to a circular conducting loop is evaluated directly from Biot-Savart Law. The results are well known but are usually derived via the vector potential. The brute-force calculations, which resort to the use of elliptical integrals, are presented along with an overview of similar techniques applied for elliptical loops.

4:15 pm PSS-5 A Gamma Ray Decay Level Scheme for $^{74}\text{Kr}^*$. JEFF BAKER, Jacksonville University, Jacksonville, 32211. Excited states in ^{74}Kr were studied via the reaction $^{58}\text{Ni}(^{19}\text{F}, p2n\gamma)^{74}\text{Kr}$ at 62 MeV in the Tandem Van de Graff accelerator laboratory of Florida State University. Gamma rays from the decay of excited nuclei were observed by means of four germanium detectors. Double-coincidence events were analyzed by projecting spectra from large two-dimensional arrays; this technique is explained. A decay level scheme was found that differed from that previously published.

*This work was supported by the NSF Summer Junior Fellow program.

Saturday 8:45 am QUAD 18
SESSION A AND BUSINESS MEETING
American Association of Physics Teachers
(Florida Section)

NOTES

RARE AND ENDANGERED BIOTA

(Florida Committee on Rare and Endangered Plants and Animals)

Friday 3:00 pm QUAD 1

SESSION A

R.E. Ashton, Jr., Gainesville, presiding

3:00 pm REB-1 A New Method for the Quantification of Reproductive Rate of the Florida Tree Snail Liguus fasciatus. J. M. JACOBSEN. The Everglades Institute, P.O. Box 653954, Miami, FL 33265. Due to the lack of suitable, manipulatable, and controllable natural habitats for study, artificial egg laying areas were placed around appropriate trees without Liguus populations. Snails were introduced on the subject trees. Successful laying of egg clutches was observed. Variables encountered in the test situation included food supply, humidity, predation, egg laying substrate and even wildfire. There is a marked shortage of natural areas suitable for Liguus research and this method makes possible the study of reproductive biology in any area with suitable trees and weather.

3:15 pm REB-2 Research Opportunities at the Ordway Preserve. RICHARD FRANZ, Florida Museum of Natural History, University of Florida, Gainesville, FL 32611. The Katharine Ordway Preserve-Swisher Memorial Sanctuary is located near Melrose, western Putnam County, Florida. This 3,750-ha preserve is jointly managed by the University of Florida and The Nature Conservancy, and functions to preserve unique xeric habitats associated with Trail Ridge and to promote opportunities for research on xeric-adapted plants and animals. Over 470 vascular plants, 26 fishes, 26 amphibians, 44 reptiles, 141 birds and 34 mammals have been identified from this site. Information on biotic communities, current studies and opportunities for research will be discussed.

3:30 pm REB-3 Florida Scrub Jay Ecology and Conservation. J. W. FITZPATRICK (1), AND G. E. WOOLFENDEN (1,2), (1) Archbold Biological Station, Lake Placid 33852, (2) Biology, Univ. of South Florida, Tampa 33620. Based on long-term demographic and life-history data on the Threatened Florida Scrub Jay, we recommend conservation and management procedures. The jay is endemic to relict and rapidly disappearing oak scrub, a habitat which must burn every 8 to 20 years to remain optimal. Family groups defend year-round territories; minimum size is about 5 ha, average size 9-10 ha. Territory size and breeder density are inversely correlated, and vary with adult and juvenile mortality. One epidemic has occurred in 20 years, killing all juveniles and about half the adults. Such catastrophic mortality profoundly influences subsequent age- and social-structure, and greatly increases probability of local extinction. We developed a simulation model to study the relationship between population size and extinction probability. For Florida Scrub Jay populations to have better than 90% probability of surviving more than 100 years, at least 0 contiguous territories must be protected. Protecting several local populations might protect portions of the meta-population from the spread of lethal epidemics.

:45 pm REB-4 Resident and Relocated Tortoises: A Comparative Study in Central Florida, 1985-1989. A. M. BARD (1), I. J. STOUT (1), AND T. J. DOONAN (2), (1) Dept. of Biological Sciences, Univ. of Central Florida, Orlando, 32816, (2) Museum of Natural History, Univ. of Kansas, Lawrence, KS 66045. This study examines a relocation effort in east-central Florida that involved a gopher tortoise population from a planned development site. Twenty-nine tortoises (12 relocated and 17 resident) were fitted with radio transmitters to document movements, habitat use, home range size and survival. Relocated tortoises had a lower fidelity to the release site, had

smaller home ranges, and tended to occur in more marginal habitats. Although the mean number of movements for relocated tortoises was less than that for resident tortoises, the relocated animals moved greater distances. Individuals from both populations increased in shell dimensions during the study; resident tortoises grew more per month, but the growth was not statistically significant from that of the relocated tortoises ($p > 0.05$). Although not statistically significant, survival of resident tortoises was greater than that of relocated tortoises.

4:00 pm BREAK

4:15 pm REB-5 Patch-corridor effects on faunal assemblages of longleaf pine-turkey oak sandhill communities. I. J. STOUT (1), AND D. T. COREY (2), (1) Dept. of Biol. Sci., Univ. of Central Fl., Orlando, 32816, (2) Dept. of Zool., Southern Ill. Univ., Carbondale 62901. We attempted to determine what the minimum size of a preserve would need to be to represent a sandhill ecosystem. Study areas with direct corridors to xeric pinelands ($n=6$) and sites without corridors ($n=6$) were selected so that each configuration was replicated in the following patch/area range: 2-6 ha, 10-14 ha, and 18-22 ha. Reptiles, amphibians, birds, mammals and spiders were sampled each season for 2 years to assess patch-species richness corridor interactions. The herpetofauna included 30 species (range 8-19 species per site). An average of 34 bird species was observed per site; about half of these were shared among the sites. Small mammal species richness was correlated with ground cover and not with area or corridors. The surrounding landscape influenced the minimum area needed to preserve the ecosystem. This work was supported by Nongame Wildlife Program contract no. RFP-86-003 from the Florida Game and Fresh Water Fish Comm.

4:30 pm REB-6 The Common Pollinators of a Rare Plant. MARK DEY-RUP AND ERIC MENGES. Archbold Biological Station, Box 2057, Lake Placid 33852. *Eriogonum floridanum* (Small) occurs sporadically in scrub and sandhill habitats in central Florida. Plants are often isolated, and produce a few short-lived flowers each day over a period of 2-3 months. Insect pollination is necessary for seed set. A large nectar supply per flower, a long period of flower production, the scattered distribution of the flowers, and the inconspicuousness of the flowers, narrows the suite of available pollinators to long-lived resident insects with an excellent locational sense that might learn to "trapline" the plants daily. A diverse group of hunting wasps (Vespidae, Eumenidae, Sphecoidea, Pompilidae) and a few bees (Halictidae) visit the flowers. By offering a dependable resource, this rare plant appears to use common, generalist pollinators as specialists.

4:45 pm REB-7 Movements of Late-nesting Loggerhead Sea Turtles Determined through Satellite Biotelemetry. C.K. DODD, JR. (1) AND R. BYLES (2), (1) National Ecology Research Center, U.S. Fish and Wildlife Service, 412 N.E. 16th Ave., Gainesville 32601, (2) U.S. Fish and Wildlife Service, P.O. Box 1306, Albuquerque, NM 87103. We have tracked two late-nesting loggerhead sea turtles (*Caretta caretta*) using satellite biotelemetry for 1.5 and 4.5 months. The turtles showed different movement patterns-one rode the Florida current then remained inshore while the other went to the Bahamas. Satellite technology, surfacing behavior, submergence times, reaction to cold fronts, and implications for conservation are described. Loggerheads are year-round residents of the shallow continental shelf off Florida's east coast. We plan to follow additional turtles in the coming year to increase sample size and verify movement patterns.

5:00 pm REB-8 Status of an endangered mammal: the Anastasia Island Beach Mouse (*Peromyscus polionotus phasma*). Philip A. Frank, Florida Museum of Natural History, Gainesville, 32611. The Anastasia Island beach mouse is a small mammal found only on Anastasia Island, a barrier island in northeast Florida. It is restricted to the narrow strip of sparsely vegetated dunes on the Atlantic coast. Coastal development has severely diminished dune habitat on the island. Viable populations exist only at two parks under public ownership; Anastasia State Recreation Area and Fort Matanzas National Monument. These parks are used intensively by beach visitors, and habitat degradation from foot and vehicular traffic is obvious. There are no public restrooms on the beaches, so the dunes often function as sanitary facilities. Feral cats eat the mice at both sites. Wise management at these parks could help insure the continued survival of this unique Florida mammal.

Friday 5:15 pm QUAD 1
BUSINESS MEETING: RARE AND ENDANGERED BIOTA
R.E. Ashton, Jr., Gainesville, presiding

SCIENCE TEACHING

Friday 8:15 am QUAD 2
SESSION A
J. Rimsa, St. Petersburg Junior College, presiding

8:15 am TCH-1 The Design and Validation of the Barry Environmental Attitude Test (BEAT). K. BARRY, Science Education Department, Florida Institute of Technology, Melbourne 32901. The main purpose of environmental education has been identified as the development of environmentally responsible citizens. A large factor in the determination of environmentally responsible behavior is the development of a positive environmental attitude. A review of the research on environmental attitudes reveals that the instruments being used show neglect in the establishment of validity and reliability. The BEAT is being developed with the establishment of validity and reliability as a primary concern. Obtrusiveness is another problem associated with attitude instruments. The BEAT addresses obtrusiveness by creating a cognitive appearance and by posing questions in the third person. A knowledge subtest is included to allow tests for correlation between environmental knowledge and environmental attitude.

8:30 am TCH-2 Mathematics Achievement and Attitudes in Barbados and the U.S. Andrew McConney, Florida Institute of Technology, Melbourne, Florida, 32901. This ex post facto study was undertaken to determine current differences in mathematics achievement between high school students in a lesser developed country (Barbados), and a highly developed country (U.S.). Attitude towards a subject has been seen to be highly correlated with achievement, and this affective domain variable was measured in order to evaluate its explanatory value in mathematics achievement. Measured differences will allow Barbados to evaluate its position in terms of mathematics achievement as compared to the U.S., and further, to evaluate the appropriateness of examination standards set by the recently established Caribbean Examination Council. U.S. educators and administrators will be interested to note whether long perceived differences in educational achievement, between industrialized and lesser developed countries, still exist. The role of attitude in achievement should also be of interest in a comparison of two systems of education with clearly different facilities and philosophies.

8:45 am TCH-3 A Comparison of Environmental Awareness among Canadian and American students. G. E. CHALLENGER, The Florida Institute of Technology, Melbourne, FL 32901. A study was conducted to compare environmental awareness among central Florida secondary students with students from a country we perceive to be more environmentally aware. An important consideration today in environmental education is one of understanding. Most environmental issues are known by students, but do they understand the underlying causes and the real cost of minimizing or stopping some of the destructive activities of man? Do students have only a superficial knowledge, and how do students from central Florida, a state wrought with environmental problems, compare with Canadian students? Another interest is where students perceive the majority of their knowledge comes from. Answers to some of these questions may help direct environmental education in the future.

9:00 am TCH-4 Science Summer Institutes for K-12 Teachers. ALEXANDER K. DICKISON (1), DAVID BARRIGER (1), LAWRENCE McADAM (1), JEANNE ROBINSON (1), SHELTON SPARKS (1), (1) Seminole Community College, 100 Weldon Blvd., Sanford, 32773. During the summer of 1989, Seminole Community College and the Seminole County Public Schools cooperated in sponsoring teacher institutes for K-12 teachers. Subject matter included: Astronomy, Chemistry, Environmental Science, Geology and Physics. This paper will briefly explain how this program was organized, funded, staffed. Experiences and reactions of the involved teachers will be given.

9:30 am TCH-5 Student Learning and Satisfaction in General Chemistry: A Comparison of Three Instructional Approaches. P.B. Horton, Science Education Department, Florida Institute of Technology, Melbourne, 32901. Numerous methods are available to college teachers who wish to introduce variety into their teaching methods, and enhance the learning of their students. Unfortunately, most college science classes still rely on the lecture approach to the exclusion of other potentially effective methods. This presentation will describe the results of a study comparing three different approaches used in a general chemistry II class. Sixty students were randomly assigned to either a lecture group, an independent-study group, or an audio-tutorial group. After the three groups had completed a unit on acid-base chemistry, achievement and attitudes were compared. The study results will be presented, along with comments on the role of varied instructional approaches in college science teaching.

9:45 am TCH-6 The Florida Science Videodisc Project. ROBERT H. FRONK, Florida Institute of Technology, 150 W. University Boulevard, Melbourne 32901. This session will describe the Florida Science Videodisc Project, a program for 30 Florida elementary and middle/junior high school teachers to learn about and work with computers and videodiscs. The \$170,000 project is funded by the Florida State Department of Education, the Indian River Region Research Institute, and Florida Institute of Technology. The project will create the "Florida Science Videodisc" with slides and video from the 30 teachers and F.I.T. faculty. The participants will be trained in interactive video development using this disc as a focus. The disc, with associated software, will be made available to all Florida teachers at cost (under \$20). The participants will receive a stipend, the disc, computer software, a videodisc player, graduate credit, and other materials.

10:00 am TCH-7 Level III Interactive Video in Science Teaching: Functional Tool or Novelty? H.L. KROUT, II, Florida Institute of Technology, Melbourne 32901. Interactive video as a part of multi-media education is being promoted as a technological answer to educational problems. This presentation describes a research project that is evaluating the development and use of Level III Interactive Video as a part of a K-9 physical science curriculum. It will include an overview of current research and a discussion of the potential use of Level III Interactive Video as a tool in the classroom. A sample Level III Interactive Video Program, using the Apple IIGS and a Pioneer LD-V2200 videodisc player, will be demonstrated.

Friday 10:30 am QUAD 2 TCH-8

SESSION B: (PANEL) "Science Teaching In 2001 AD; A Futuristic View"

J. Rimsa, St. Petersburg Junior College, presiding

The motion picture, Space Odyssey 2001, brought the attention of the American public to the problems and adventures of space exploration in the 21st century. Coincidentally, the students who have entered the first grade this past fall will be members of the high school graduating class of 2001 A.D. What will science education and science teaching be like in the year 2001? This question is the topic that the futuristic thinking members of the 2001 panel will discuss. You may agree or disagree with the opinions of the panelists, but be there to share your views during the question and answer period. Members of the 2001 panel are: Dr. John Rimsa, St. Petersburg Junior College - moderator; Dr. Betty Abbott, Florida Foundation for Future Scientists; Dr. Martha Green, Curriculum Specialist, Florida Department of Education; Dr. Phillip Horton, Department of Science Education, Florida Institute of Technology.

Friday 11:30 am QUAD 2

BUSINESS MEETING: SCIENCE TEACHING

J. Rimsa, St. Petersburg Junior College, presiding

Friday 1:00 pm Teaching Pavilion

ANNUAL BUSINESS MEETING: FLORIDA ACADEMY OF SCIENCES

and Plenary Address I

Friday 3:15 pm Teaching Pavilion

ACADEMY TUTORIAL: SURVEY OF NEURAL NETWORKS

By D.W. and L.V. Fausett, Florida Institute of Technology

Friday 3:15 pm QUAD 2

SESSION C

J. Rimsa, St. Petersburg Junior College, presiding

3:15 pm TCH-9 The Arboretum of the University of Central Florida: Active and Passive Environmental Learning Strategies, H. O. WHITTIER. Department of Biological Sciences, Univ. Central Florida, Orlando, 32816. While global forests disappear at alarming rates in the tropics, it is imperative that the Florida public of all ages be aware of the impacts of local development, habitat and species' losses. Established in 1983, The Arboretum of the University of Central Florida actively and passively serves educational needs for a variety of age (preschool to post-retirement) and academic levels. As the master plan for The Arboretum matures, three kinds of display areas are maintained: (1) semiformal; (2) informal; and (3) wild or natural. Involvement by community action groups, public school and university students, local businesses and others keeps maintenance and materials costs minimal. Passive (non-threatening) education is provided by signs which label, and

identify plants and offer interesting information about them. Active contact is provided by staff and student (Biology and College of Education) guides. University students grow various kinds of plants in The Arboretum including rare or endangered plants as part of their undergraduate and graduate research thesis projects. Area public schools and community colleges are encouraged to use their own campuses for similar projects.

3:30 pm TCH-10 The Effect of an Outdoor Educational Program on Environmental Attitudes and Career Interests. Amanda L. Woods, Florida Institute of Technology, Melbourne, 32901. A study was performed to investigate the effects of an environmental program with outdoor field experience on the environmental attitudes, defensibility, and science and engineering career interests of secondary school students. Positive significant effects of the environmental program on both attitude and defensibility were found, and retesting six months later showed no significant differences in scores, providing support for the retention of positive environmental attitudes. The application of environmental programs to all stages of school life was supported by this study. It is felt that environmental instruction with outdoor field experience facilitates a change to more positive environmental attitudes.

3:45 pm TCH-11 SEAS - Science Education At Sea: A Model for an Exciting, Hands On, Field Oriented Program In Environmental Education. JOHN G. WINDSOR, JR., SEAS Director, Dept. of Oceanography & Ocean Engineering, Florida Inst. of Technology, 150 West University Boulevard, Melbourne, 32901-6988. The Department of Oceanography and Ocean Engineering at F.I.T. has offered a unique program of undergraduate, oceanographic studies for many years, the highlight of which is Marine Fields Project, an intensive summer program of field studies where classroom knowledge is applied to solve real environmental problems. In recent years science educators from local secondary schools have participated in the summer program. The marriage of science education and environmental research serve as the core of SEAS, which reaches out to students from preschool to senior citizens. The program can be easily modified to be used at any school system in the nation where local environmental awareness is of interest. Support for these studies come from the Dept. of Oceanography & Ocean Engineering at F.I.T.

4:00 pm TCH-12 The Everglades Youth Camp: A Field Laboratory for Environmental Education. R. A. MOHR, Science Education Department, Florida Institute of Technology, 32901. The Everglades Youth Camp, established for conservation education in the early 1950's, is examined from the historical- educational perspective. Current use of the facility as a learning center for youth, adult, and teacher education is described. The camp serves as a teacher inservice site for Project WILD and other programs. Its summer youth camp program includes the nation's second largest program for children with Epilepsy. Its unique location provides a field education opportunity for special interest groups, and serves to bring together a diversity of experts concerned with addressing Florida's environmental challenges through education. These and future roles, such as the potential for resource pooling with universities for the enhancement of teacher and biologist training, as well as the expansion of summer youth programs, are examined.

4:15 pm TCH-13 A Public Educational Program for the Kissimmee River Restoration Project. JOHN D. BROOKS, Nova University, Ft. Lauderdale, FL 33314. This paper addresses the problem of generating a higher level of awareness about the Kissimmee River Restoration project and the whole south Florida water system in a specific portion of the general population.

One potential solution to this problem is the development of a public awareness program that centers around a 10 minute video tape program . The paper outlines the development of the program, the method for deployment, the target population, and the method of evaluation . It also includes a review of the literature that supports the use of the television medium as an effective method of delivering a public awareness program. It further provides a discussion of the results when the program was administered to a test population. The actual video produced will be presented.

4:30 pm TCH-14 Using Student Produced Educational Videos as an Interactive Final Exam. MARY FAHNING-BROOKS, Saint Andrew's School, Boca Raton, FL 33434. In lieu of a standard final exam in physics, students produced a series of video presentations inspired by "Moments in Modern Physics" (University of Central Florida). The purpose of this activity was to generate interest in modern physics and insure that students enrolled in physics were exposed to the direction of study being pursued in physics today. To achieve this end, each student signed up for a topic of choice and contracted with a study group to research the topic. The end result for each group was the production of a short (7-9 minute) video addressing the major concepts of the topic. The videos were then presented to all students enrolled in physics during the final exam period. Following the presentations all students scored 80% or better on an objective test of the material. Clips from the student videos will be presented.

4:45 pm TCH-15 Group Discussion on Science Teaching Concerns in the 1990's. Led by J. RIMSA, St. Petersburg Junior College, St. Petersburg 33733. This open discussion will provide participants the opportunity to discuss concerns confronting science teachers in the current decade.

NOTES

SOCIAL SCIENCES

Friday 10:00 am QUAD 1

SESSION A

G. Patterson, Florida Institute of Technology, presiding

10:00 am SOC-1 Moonstruck in Ithaca: Family Order and Violence in Homer. R. W. STOECKEL, Florida Institute of Technology, 150 University Blvd., Melbourne, FL 32901. "Omerta, honore, and famiglia are as natural as geological formations among a people ravaged by bullies and plunderers." Although Professor Robert Kelley is here discussing the Mafia, he suggests that the Mafia is not indigenous to Sicily. Indeed, Paul Veyne accepts as given that "whoever protects controls, and whoever controls pillages...A Roman noble has more in common with [a] 'godfather' than with a modern technocrat." This paper explores the tensions inherent in the Mycenaean hero's ambivalent career as private family man and a public plunderer.

10:20 am SOC-2 Perspectivism, Deconstruction, and the New Cultural Critics. G.M. PATTERSON, Florida Institute of Technology, 150 University Blvd., Melbourne, FL 32901. The problem of interpretation lies at the center of current historical, philosophical, and literary debates. Nietzsche was the first philosopher to recognize the problematical status of all interpretive acts. This paper presents an analysis of the efforts of deconstructionists and the new cultural critics to claim Nietzsche's legacy and to provide a theoretical basis for interpretive acts.

10:40 am SOC-3 The Uselessness of the Humanities. R.L. SHEARER, Florida Institute of Technology, 150 University Blvd., Melbourne, FL 32901. A humanities curriculum is sometimes regarded as out of place at purely technical "universities." Inasmuch as the ideal of technology is the practical application of science, the humanities have occasionally been criticized as "useless." This paper agrees with that term, but not the critical context in which it most usually appears.

11:00 am SOC-4 The Scientist: Hero or Villain? R. RIPMANN, Florida Institute of Technology, 150 University Blvd., Melbourne, FL 32901. The scientist as perceived by popular film presents us with images that recall our deepest fears. Using the classic film, Dr. Strangelove, as well as other contemporary films as illustrations, this paper will explore the dark side of the archetypical tinkerer: this symbol of technology and science who embodies our greatest fears and our greatest hopes.

Friday 11:30 am QUAD 1

BUSINESS MEETING: SOCIAL SCIENCES

G. Patterson, Florida Institute of Technology, presiding

AMERICAN ASSOCIATION OF PHYSICS TEACHERS
(Florida Section)

Saturday 7:00 am Holiday Inn Oceanfront
BREAKFAST (Dutch Treat): All physics teachers are welcome.

Saturday 8:45 am Quad 18
SESSION A
B. McCord, Valencia Community College, presiding

8:45 am APT-1: The AAPT Lowell Seacat Invited Paper.

Infrared Detectors and Materials, J.D. Patterson, Physics/
Space Sciences Dept., Florida Institute of Technology, Melbourne, FL 32901.
Infrared (IR) radiation has wavelengths from 1 micron to 1 millimeter,
but the atmospheric windows at 3-5 microns and 8-14 microns are of most
interest. IR radiation was discovered by William Herschel in 1800. In
1959, W.D. Lawson found that $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$ (MCT) had a tunable band gap
(with x) and that it could be used as a detector of IR radiation in the 10
micron range at 77K. It has since become one of the most common materials for
IR detection. We will review the IR properties of MCT and related
materials and give some results of our calculations on the mobility of
electrons in MCT.

9:30 am BREAK

9:45 am APT-2 A Summer AP Physics Workshop: A Place for Rejuvenation.
ALEXANDER K. DICKISON (1), JAMES HELMICK (2), AND NELSON H. McAFEE (3),
(1) Seminole Community College, 100 Weldon Blvd., Sanford 32773, (2) Lake
Brantley High School, Altamonte Springs 32714, (3) Countryside High School,
Clearwater 34621. A five-day summer workshop on AP Physics was held. Fifteen
teachers from around the state attended. The teachers in attendance had varied
backgrounds, from active involvement in teaching AP physics, to serious consid-
eration about teaching it, to merely curiosity about what the course involves.
The workshop was divided between problem solving and developing demonstrations/
experiments. All the participants left with a notebook of worked problems and
a box of materials and equipment. The energy and enthusiasm at the workshop
was very evident.

10:00 am APT-3 Models, Idealism, Realism. JAMES G. POTTER, Florida Institute of
Technology, Melbourne, FL. Models are all we can teach. Is there really anything but
ideas? Let's present the model vividly.

10:15 am APT-4 Non-intimidating Physics. J. O. SCHWEBEL, Maynard Evans High
School, 4949 Silver Star Road, Orlando 32808. Experience has shown that many
students, otherwise qualified, never attempt a physics class because the repu-
tation of the subject frightens them. By the use of vigorous recruiting,
learning strategies, and careful consideration of the needs of the students,
enrollment in physics classes at this minority high school has increased from
107 to 160 (a 49.5% increase) in a single year.

10:30 am APT-5 Back To Our Roots: A Trip to England and Scotland. Alexander
K. Dickison, Seminole Community College, 100 Weldon Blvd., Sanford, 32773. During
the summer of 1989, I had the opportunity to tour places in England and Scotland
important to classical physics. These sites included Maxwell's school, Newton's
home, Greenwich, and the Science Museum. Vacation slides will be shown. "No one
can leave 'till the show is over."

10:45 am BREAK

11:00 am APT-6 Creating and Teaching an Undergraduate Electro-Optics Laboratory. J. S. BROWDER, T. M. HAKIM, and P. R. SIMONY, Jacksonville University, Jacksonville, 32211. At the previous Florida AAPT meeting we reported on a plan to develop an undergraduate electro-optics laboratory course in the physics department at Jacksonville University. Using funding from an NSF grant, this course was initiated in January 1990. A report on the equipment and lab facilities designed for this course and an evaluation of the experiments completed thus far will be presented. Supported by NSF Grant #NSF 8853080.

11:15 am APT-7 Operation Physics. BETTY VAIL, West Orange High School, 1625 South Beulah Road, Winter Garden, FL 34787 and MARY MELVIN, Colonial High School, 6100 Oleander Dr., Orlando, FL 32807. A report on the current status of the Operation Physics program in Florida will be given. The response from fourth through eighth grade teachers has been enthusiastic. Plans for training more teachers will be discussed.

11:30 am APT-8 Physics "Originals". LESTER DWYER, Chaminade-Madonna College Preparatory, 500 Chaminade Drive, Hollywood, FL 33021. I will introduce a teaching technique which I use with each physics packet. For years, I have required that the students complete an "original" with each chapter or packet. These have the spirit of a mini science project with a much broader scope. Samplings of student videos will be shown.

11:45 am APT-9 Teaching the Bomb. P.R. SIMONY (1) AND C. BUETTINGER, (2) Department of Physics, Jacksonville University, Jacksonville, FL 32211, (2) Department of History, Jacksonville University, Jacksonville, FL 32211. A course on the development of atomic weapons and atomic power is currently being team-taught by a historian and a physicist to twelve honors students at Jacksonville University. A synopsis of the course will be presented along with an evaluation of the usefulness of such an interdisciplinary course and encouragement for anyone wishing to initiate a similar course.

Saturday 12:00 noon Quad 18
BUSINESS MEETING: AMERICAN ASSOCIATION OF PHYSICS TEACHERS, FLORIDA SECTION
Election of Officers and Awards Ceremony

Saturday 12:15 pm Quad 18
Tour of Florida Institute of Technology Physics and Astronomy Departments
J.D. Patterson, Florida Institute of Technology, leader.

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LOCATION OF THE 1991 ANNUAL MEETING

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